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BOWLES' ALTERNATE BID ON ARMORED CRUISERS

When the bids for the armored cruisers North Carolina and Montana were opened by the navy department recently, contracts for the construction of which were awarded to the Newport News Ship Building & Dry Dock Co., it was found that Mr. Frances T. Bowles, president of the Fore River Ship Building Co., had submitted an alternate bid proposing to equip the two cruisers with turbines. The bid was not answered but nevertheless was most interesting as showing that the former chief instructor of the navy believed in this form of engine for even so important a warship as an armored cruiser. The bid also suggested important alterations in the form of battery. Following was President Bowles' alternate bid:

"This letter is submitted in explanation and description of our bid of this date on an armored cruiser, or cruisers, of 14,500 tons displacement each, and is accompanied by a set of plans numbered from 1 to 11, inclusive, showing the modifications in the department's plan upon which this bid is based. This bid is offered under the terms of the act appropriating for these vessels and with particular reference to the following words: 'And the contract for the construction of these vessels shall be awarded by the secretary of the navy to the lowest best responsible bidder, having in view the best results.'

"Believing that at the time in 1902 when the designs for the armored cruisers Tennessee and Washington were prepared that these vessels were not only the most effective of their class designed up to that date, but that they also met with care and sufficiency such criticisms as had been made by officers of the navy upon vessels previously built and designed with special reference to the isolation and the operating of the elements of the battery, the safe and rapid supply of ammunition, and armor protection, but it is also apparent that since the date of these designs and due to the experience of other countries with large armored cruisers, a legitimate criticism upon these designs has been made that a considerable portion of the battery is located too near the waterline for effective use at sea. Therefore, with a view of overcoming this objection and also with a view of obtaining a further and better protection of the vitals of the vessel by armor, a better isolation and efficiency of the battery and a greater end-on fire, we have prepared and submit those designs believing that the fighting value of the vessel will be greatly enhanced.

"We have also arranged to present to the department in this design the Curtis marine turbine, an American invention already highly developed for stationary use, in place of triple-expansion reciprocating engines. There will be one low speed reversible turbine on each of the twin-screw shafts. After investigations we are satisfied that this turbine has great superiority over the old style engine in features of particularly essential value in naval vessels of the cruiser class. In this vessel it gives assurance of higher speed by its ability to convert into power all the steam the boilers can produce, whereas the simplicity of its construction and small number of parts is an assurance of its far greater readiness for service under all conditions.

"With particular reference to the circular defining the chief characteristics of these vessels in accordance with the department's designs, the modifications which we submit are, in brief, as follows:

"1. The battery. Referring particularly to sketch plan No. 1, it will be observed that eight of the 6-in. guns carried on the gun deck of the department's design at a height of 14 ft. 6 in. above load waterline, have been raised to the main deck level and together with four of the main deck guns, are mounted in pairs in six turrets. Therefore, the increase in height of the eight 6-in. guns will be from 14 ft. 6 in. to 23 ft. above the waterline. The only 6-in. guns remaining on the gun deck are those forward and aft having a fore and aft fire. The result of this change is to give two additional 6-in. guns firing ahead and two firing astern, making the total ahead fire two 10-in. and six 6-in. guns. The 6-in. guns will be inclosed in turrets of which the general features are shown in plan No. 2, consisting of 6-in. armor with 6-in. barbette and a 4-in. ammunition tube leading to the protective deck, the turning mechanism and ammunition supply being operated from a passage below the protective deck.

"2. The design provides for carrying the same number of guns of all calibers as the department's plans and gives equal protection to all the minor guns, excepting only four 3-in. guns on the upper deck amidships, two on each side.

"3. The armor protection. The armor protection provided on the alternate design is shown in detail on plan No. 3 and the comparative armor protection of this design and the department's plan is clearly indicated on plan No. 1. The principal feature of the change consists in increasing the thickness of the main belt throughout its length between the 10-in. turrets from 5-in. to 6-in., which at 3,000 yards would render the ship impenetrable by a 6-in. gun, whereas on the department's design the main belt is penetrable by a 6-in. gun and only proof against a 5-in. gun. All the other features of the armor protection correspond with those of the department's design, including the protective deck.

"4. Propelling machinery. In place of the department's design of vertical twin screw four-cylinder triple-expansion engines a combined indicated horse power of not less than 23,000, we propose to substitute twin screw turbines of 11,500

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H. P. each, having 12 ft. diameter H. P. buckets, and making at maximum power about 300 revolutions per minute. We shall be able to satisfy the department that the steam economy of the proposed turbine will compare satisfactorily with that of the department's design of reciprocating engines. The boiler installation will correspond precisely with the department's conditions. All miscellaneous engineering requirements, auxiliary steam machinery and equipment requirements will be complied with in accordance with the department's circular, plans and specifications."

LIVERPOOL SHIPPING LETTER

Liverpool, Dec. 26.—In spite of the declared intentions of the Canadian steamship lines to advance steerage rates shortly, there has been no move made indicating that the Cunard and White Star lines will follow their lead. In the offices of the chief lines affected it is stated that no change whatever has been made or is likely to be made. It is believed that unless the White Star Line consent to certain conditions which are pretty well known, the Cunard company will not yield in any way to the appeals which have been made to them to rejoin the North Atlantic conference. The White Star Line, in the meantime, seem content to engage with the Cunard company on their own special preserve, and are vigorously following up a policy of competition from which much seems to be expected. The westward sailings of the White Star vessels are just now carrying a good number of Scandinavians, and this feature is understood to be a considerable drain upon the resources which have been hitherto flowing in the Cunard steamers. It is also believed in Canadian shipping circles here that the construction of two large steamers will shortly be commenced, and from these new developments important results may be expected. There is further a rumor current in Liverpool that the Grand Trunk railway has for some time been making observations, the outcome of which is not yet known.

The great shipping firm of Messrs. Elder, Dempster & Co. have, it appears, been making serious efforts to purchase the Royal Mail Steam Packet Co. Sir Alfred L. Jones, K. C. M. G., the senior member of Elder, Dempster & Co., admits that his firm have made what he considers to be a very generous offer to the directors of the Royal Mail company for the purchase of the whole of the steamers of the company in question. This means, of course, the acquisition of the great Liverpool firm of the whole of the ships, business and good will of the well known Royal Mail line, and its extensive ramifications. The offer was, however, declined, and that being so the publication of the terms submitted, Sir Alfred Jones thinks, would not be advisable; but it is understood that the offer made to the Royal Mail line provided for the retention of the interest in the company that any of their shareholders might desire, together with a stipulated rate of interest on the cash purchase price of the shares. As this attempted shipping deal has caused some interest in shipping and financial circles, the Royal Mail company has caused the following paragraph to be inserted in the London newspapers: "Mr. Owen Philipps, chairman of the Royal Mail Steam Packet Co., having had his attention called to a report about a rumor of a big shipping deal, states that the report in question only has this slight element of truth, viz., that once or twice during the last three years, Sir Alfred Jones had, through a third party, made some preposterous suggestions on the subject of purchasing the Royal Mail, which suggestions had never been deemed worthy of serious consideration. As is well known, the firm of Elder, Dempster & Co. has for several years been competing with the Royal Mail in the Jamaica trade, and between the lines of Sir Alfred Jones' statement it may be clearly gathered that the results of his venture into the West Indian trade, have not been financially satisfactory. In conclusion, Mr. Owen Philipps states emphatically that the old Royal Mail is no more for sale than the Bank of England." And thus the matter stands at present. Whatever happens, the Royal Mail company cannot help but be seriously affected by the coming new departure of Messrs. Elder, Dempster & Co. in placing a splendid new turbine fleet on a service covering the whole of the West Indian islands.

A memorandum drawn up by the commercial attache to the British embassy at Berlin states that fifteen new vessels with a gross tonnage of 117,850 tons, are being built for the Hamburg-American Steamship Co. This will bring the total for this line to 141 vessels, with a tonnage of 711,856 tons gross. The two largest are to be ships of 25,000 and 22,500 tons gross respectively, destined for the Atlantic voyages to New York. Three others of 5,900 tons each are being built for the East Asiatic Line, and three others of 6,050 tons each are to be put on the service to the west coast of South America. Two ships of 8,000 tons are also on the stocks in England, but their service is not yet announced. A new departure is about to be made by this company in the case of the two new steamers for the Atlantic trade, inasmuch as a contract has been signed for the establishment on board of a restaurant a la carte, in addition to the usual table d'hote arrangements, and tickets can be purchased for the voyage alone. One of these new German Atlantic liners is expected to be ready in the summer of 1905, and the other in April, 1906.

The American Line mail steamer, St. Louis, has returned to the New York-Southampton service again, and last week re-opened her career by embarking close upon 1,000 passengers for New York. During her overhaul by Messrs. Harland & Wolff at Belfast, she has undergone material alteration. A third-class dining hall has been opened capable of seating over 200 persons, and a number of four-berth rooms, hitherto forming part of the second-class space, are now at the disposal of women holding steerage tickets. Improvements have also been effected in the accommodation for second-class travelers.

The best order that has been given for some time past has just been given to the Fairfield Ship Building Co. by the Canadian Pacific Railway Co. This company decided some time ago to go in for modern passenger lines to put on the Atlantic service and run in conjunction with the Beaver fleet, which was acquired from Messrs. Elder, Dempster & Co. Two large ships of 17 to 18 knots speed were tendered for by several of the leading ship building yards, and as already indicated, the contract has been given to the Fairfield company.

Messrs. Stephen & Son of Glasgow on Thursday launched the turbine steamer Virginian for the Allan Line. The Virginian, which is 12,000 tons, is 540 ft. long and has accommodation for 1,300 passengers. The launch of this vessel marks a further advance in the progress of the steam turbine as supplied to ocean steamers, and Messrs. Allan Brothers & Co. must be congratulated on their pluck and enterprise in installing this method of propulsion in a vessel of the size and type of the Virginian, which, with her sister ship, the Victorian, now completing at Belfast, will be the first turbine liners to cross the Atlantic.

It is stated on what appears to be good authority that with the new year, important developments will take place in connection with Queen's Island ship building yard (Harland & Wolff's) Belfast. The principal of these will be the reconstruction of the firm itself, with Lord Iveagh and Mr. J. Bruce Ismay as partners, and the laying down of the keels of the two largest vessels ever yet built.

By the Thames harbor bill (1905) a Thames harbor commission is proposed to be incorporated with twenty-four nominated and thirteen elected members. The commissioners seek power to construct a dam with lock, weirs, sluices, roadway, tunnel and bridges in the borough of Gravesend and neighboring parishes. Six years are allowed for the completion of the work. In the financial part of the bill the commissioners seek power to borrow $25,000,000 upon the security of the rents, dues and tolls.

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JEEBI'S RECORD

In the issue of Aug. 11 the Marine Review published the record of the little 21-ft. Jeebi in the open jib and mainsail class, designed by Thomas Clapham, Roslyn, N. Y., for Arthur Brown of Flushing, L. I. The performance of this little craft during the past summer has been most remarkable. She won every race in which she entered—thirteen straights. She was the smallest among the seven that raced in the 21-ft. open class and would have been permitted to carry larger sails than she did carry. She won her race in all kinds of weather from calms to fifty-mile winds, yet it is a fact that she was never reefed on any occasion during the races. She draws only 8 in. of water, and has a center board of oak and carries no ballast either inside or outside and has a very short overhang at bow and stern compared with her competitors. As the Gazabo and Luto II. are purely racing machines of the Swallow type this performance of little Jeebi seems to be a practical reproof of the exaggerated frauds of the long overhang and fin keel types. It is interesting to note that although all of Jeebi's competitors were larger and had to allow time, she was only on two occasions required to take advantage of the allowance.

The Jeebi is not the first of her kind, as Mr. Clapham designed one like her twelve years ago and only last week he received a letter from the owner saying: "For twelve years my boat has not been beaten and now I want to get another as a larger boat has recently gotten a little the best of me."

RACING RECORD OF JEEBI, SEASON OF 1904 IN THE LONG ISLAND SOUND YACHT RACING ASSOCIATION, 13 STRAIGHT VICTORIES, NO DEFEATS. CHAMPION OF 21 FT. CLASS, 1904.

Date	Club	Boat	Time		Wind	Sea	Remarks
			Elapsed	Corrected			
May 30	Harlem	Jeebi	2.39.00	2.29.29	Light to 18 miles per hour	Smooth to choppy	1st Race. Wins. 9 miles
		Gazabo	2.42.00	2.35.56			
		Skip	2.39.10	2.32.04			
		Wave	2.39.20	2.39.20			
June 4	Knickerbocker	Jeebi	2.48.16	2.48.16	Light to 15 miles	Smooth	2d Race. Wins. 10½ miles
		Arline	Did not finish	2 miles behind			
June 11	Manhasset Bay	Jeebi	4.31.36	4.27.28	Light to heavy. Finished in a squall	Smooth to choppy	3d Race. Wins. 10¼ miles
		Gazabo	4.34.26	4.34.26			
		Skip	4.36.20	4.35.05			
		Luto II	Did not finish				
June 18	Larchmont	Jeebi	5.01.30	4.57.28	Light	Smooth	4th Race. Wins. 10½ miles
		Gazabo	5.07.32	5.07.32			
		Luto II	Did not finish				
		Ethel	5.08.00	5.07.48			
June 25	Seawanhaka Cor	Jeebi	2.16.15	2.16.15	18 miles	Choppy	5th Race. Wins. 8¼ mi S O.
July 2	New Rochelle	Jeebi	1.33.44	1.31.27	35 to 50 miles	Heavy	6th Race. Wins. 8 miles
		Gazabo	Did not finish				
		Skip	1.38.52	1.38.52			
July 4	Larchmont	Jeebi	2.44.08	2.39.55	40 to 50 miles	Very heavy	7th Race. Wins. 11 miles
		Gazabo	2.41.46	2.41.46			
		Skip	Did not finish				
July 9	Riverside	Jeebi	2.15.08	2.15.08	15 miles	Choppy	8th Race. Wins. S O 10 mi.
July 16	Larchmont	Jeebi	3.20.17	3.16.04	12 to 15 miles	Smooth to choppy	9th Race. Wins. 11 miles
		Gazabo	3.32.54	3.32.54			
		Skip	Did not finish				
Aug. 6	Hempstead Har	Jeebi	3.36.00	3.31.29	6 to 3 miles	Smooth	10th Race. Wins. 11¼ miles
		Gazabo	3.37.30	3.37.30			
		Skip	Did not finish				
		Luto II	Time not taken				
Aug. 13	Horseshoe Har	Jeebi	2.16.57	2.13.08	Light to 15 miles	Fairly smooth	11th Race. Wins. 9½ miles
		Gazabo	Did not finish				
		Luto II	2.23.18	2.23.18			
		Ethel	2.21.18	2.20.57			
Sept. 3	Larchmont	Jeebi	2.21.44	2.19.31	Very light, 5 miles	Smooth	12th Race. Wins. 5½ miles
		Gazabo	2.28.26	2.28.19			
		Luto II	2.39.20	2.39.20			
		Skip	Did not finish				
Sept. 17	Manhasset Bay	Jeebi	3.38.36	3.34.15	Light to 15 miles	Smooth to fairly rough	13th Race. Wins. 10¾ miles
		Gazabo	3.44.02	3.43.59			
		Luto II	3.39.51	3.39.51			
		Ethel	3.46.03	3.45.57			
		Skip	3.37.47	3.36.19			

RACING MEASUREMENTS AND ALLOWANCES.

Jeebi	19.00 feet.		
Gazabo	20.10 "	Allows Jeebi 23.97 seconds per mile.	
Skip	20.08 "	" " 16.13 " " "	
Luto II	21.00 "	" " 24.20 " " "	
Ethel	20.08 feet.	Allows Jeebi 21.93 seconds per mile.	
Wave	25.00 "	" " 63.53 " " "	
Arline	19.29 "	" " 3.87 " " "	

The table given on this page summarizes the performances of Jeebi in every race she entered last year.

The big steamer Minnesota, built at New London, Conn., for the Great Northern Steamship Co., to be used between Puget Sound and the Orient, reached San Francisco on Dec. 14, seventy-four days from Norfolk, Va., fifty from Bahia and twenty-one from Coronel. After a stay of about a week, she went to Seattle. She is the largest and most completely equipped vessel that was ever in the port of San Francisco. She left Norfolk with 15,000 tons of coal, burning 5,500 tons on the voyage round the Horn. 3,000 tons were discharged at San Francisco and the rest at Seattle.

The United States civil service commission is inviting applications for the position of marine firemen on the steamers Sprig and Carroll in the quartermasters' department at large, Fort Howard, Md., at $600 per annum and rations. Application may be made by mail to the commission at Washington.

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FORECAST OF THE COMING SEASON

Buffalo, Jan. 3.—There is already considerable forecasting of the coming lake season and as a rule the outlook is pronounced better than last, which is of course not a very difficult guess. There is at least prospect of more freight to carry, but the labor problem is again in sight, to be taken up when the Lake Carriers' association is in session. There appears to be some difference of opinion as to the course to be taken in this matter. It is found that the captains are using their influence to bring about a general war on the remaining unions afloat. They recall that they had to make their fight last season alone, with all the other unions looking out for themselves and some of them at work before the captains' strike was broken.

Some of the vessel owners are inclined to see in this an opportunity for falling to and making a finish of lake unionism, but the idea is not shared by all. Some of them say that the time to do that was last season, with so little business in sight that it made little difference whether the fleet went out early or not. Nobody relishes a repetition of the war, which came near going the other way. Of course with the cooperation of the captains there would be a good start made, but the licensed engineer is about as necessary on board as the licensed master. It will take the meeting of the Lake Carriers' association to determine what will be done.

With steel moving there will be business the coming season and it is estimated that the big corn crop, with a good showing of oats and flaxseed will more than meet the shortage of wheat and there will be coal and lumber as usual. Rates ought to be at least as high as they were last season. The possibility of piling in any stuff that can be carried by lake in a hurry and at a pace not approached by rail will continue the lead of the water route indefinitely.

A lake man was told lately by a railroad official that the water routes were all beaten by the roads. It was cheaper to carry freight by rail than by water. All that the lake man had to do was to point out the fact that the mere ton-mile problem was no longer the one to be considered. Let the roads be able to move freight fairly for nothing and there would be plenty of reason, at least at times, when it would be best to pay a good rate for water shipment.

It is the terminal problem that is beating the roads now and it looks as if that would steadily grow worse. It certainly has done so of late years. Here is our trunk line system fairly paralyzed now on account of the choking up of certain lines east, particularly the New York, New Haven & Hartford, which has been under embargo for sometime, till every siding eastward from here is full of some sort of freight waiting for that road to get to the surface again. The more cars there are the easier it is for a line to become blocked. This is never the case with the water routes. When the barge canal is in operation between Buffalo and New York it will be easy to figure within a few hours the time when freight starting at any port on the route will be ready for the ocean steamer. Let anyone try the same calculation by rail!

There is much talk of more elevator accommodation here, though it seems to be the idea that the railroads ought to provide it. This port could make use of 10,000,000 bu. additional capacity, it is estimated, and it would be used largely for winter holding of grain that has come down the lakes late in the season and is wanted for export through the winter. When the fall congestion is out of the way it would be easy to run time freights to tide water and meet the foreign demand from here on about as exact time as the same thing could be done by lake and canal in summer.

A vessel owner expresses the hope that there may be some adjustment of shoveling charges here before long. He notes that he has to pay $2 per thousand here, while at the Georgian bay points the same work is done for 90 cents. It looks, though, that some other adjustment must be made before that can be done, as the elevators are making very little money now at the best. It is a complicated problem. Possibly the solution will appear of its own accord, but it is not looked for. What the elevator owner ought to be is a shipper as well and then he could see both sides of the case at the same time.

Slowly the last end of the fleet is getting into winter quarters. It has been a hard task to make the many shifts necessary and there is considerable to do yet. By the end of this week it is expected that all but the winter cargoes will be out and everything will be placed for the lay-off season.

JOHN CHAMBERLIN.

ADDITIONS TO THE NAVY

Twenty-one vessels of various types, including five battleships, four armored cruisers, two protected cruisers, two gunboats, five torpedo boats, two training ships and one training brig, will be added to the navy during the coming year, according to the estimates of the navy department. In size and number these compare most favorably with preceding years, and the new vessels will do much toward making the American navy one of the strongest in the world. Five torpedo boats, the Stringham, Goldsborough, Blakely, Nicholson and O'Brien, are near completion and will be ready for service soon. The battleships to be put into commission during the year, if finished as expected, are the Virginia, on Oct. 15; the Nebraska, Oct. 15; the Georgia, Dec. 12; the New Jersey, Dec. 3, and the Rhode Island, Nov. 12. The armored cruisers are the Pennsylvania, to be completed Feb. 13; the West Virginia, Jan. 30; the California, Dec. 10, and the Maryland, March 12. Two protected cruisers, the Galveston and Charleston, will be completed on April 1 and June 17, respectively. The gunboat Dubuque is scheduled for completion on Jan. 21 and the Paducah on April 21.

W. O. Demers, keeper of the Caribou Island light, Lake Superior, and Fred Pelletier, his assistant, were taken from their station last week by the tug James Reid of the Reid Wrecking Co. of Sarnia, and with the tug Boynton of the Great Lakes Towing Co., which accompanied the Reid, were taken to Sault Ste. Marie. For over a week the fate of these two men had been in doubt. About a week ago the tug stopped at the island and blew whistles but received no answer from the light keepers. Heavy sea was running at the time and it was impossible for the tug to land. The conclusion was reached that the keepers had left the island in their little sail boat thinking that probably they had been overlooked by the government when it removed the keepers of the other lighthouses. The Reid and the Boynton were then sent out from Sault Ste. Marie on a tour in the hope of discovering the keepers. They were eventually found perfectly snug and content at Caribou lighthouse. They did not answer the signals of the Reid on the ground that they thought the tug would land in case it was after them.

The British admiralty has invited tenders and plans for 33-knot torpedo boat destroyers, which is certainly a wonderful advance on the 25½-knot boats. Turbine machinery will replace the ordinary reciprocating engines. Some time ago the admiralty endeavored to get 32 knots out of its torpedo boat destroyer but found it impossible to do so. It will, therefore, be interesting to watch the attempt to get 33 knots with turbines.

The Halifax board of trade is considering the advisability of assisting in the establishment of a steel ship building plant in that city. A representative of the firm of Swan & Hunter, the great British ship building firm, is at present in Nova Scotia and is understood to have offered to subscribe one-half of the capital necessary to promote a steel plant.

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LUMBER RECEIPTS AT THE TONAWANDAS

During the season of 1904 the Tonawandas received a total of 414,806,940 ft. of lumber by lake. While this is about 44,000,000 ft. less than was received last year, it exceeds expectations and places the Tonawandas in the lead as the greatest lumber receiving port on the lakes. The following table shows the receipts of lumber, lath and shingles for each of the past thirty-one years:

Year	Lumber, feet	Lath, pieces	Shingles, pieces
1873	104,999,000	1,258,000	1,112,000
1874	144,754,000	1,506,000	10,822,500
1875	155,384,805	6,559,200	18,088,509
1876	207,728,327	6,137,770	18,907,500
1877	221,867,007	5,126,040	23,249,200
1878	206,655,122	3,629,300	21,435,500
1879	250,699,043	5,606,400	30,122,000
1880	323,870,814	1,249,600	22,920,000
1881	415,070,913	282,000	24,271,000
1882	433,241,000	419,000	38,312,000
1883	398,871,052	6,031,850	55,817,000
1884	493,268,223	16,367,000	66,285,000
1885	498,631,400	7,652,000	52,004,000
1886	505,425,000	11,883,000	52,825,000
1887	501,237,850	4,096,000	58,435,000
1888	269,522,200	16,617,300	64,903,000
1889	676,017,200	11,506,000	68,712,000
1890	718,850,900	13,039,600	52,232,300
1891	505,512,000	8,209,800	53,561,000
1892	498,005,000	6,342,245	42,809,300
1893	430,249,000	13,232,600	35,257,400
1894	406,538,000	8,495,450	31,478,700
1895	421,372,500	8,547,000	41,810,650
1896	489,675,500	7,186,750	35,822,750
1897	601,876,450	7,528,300	48,501,200
1898	479,096,136	3,501,500	78,674,500
1899	541,576,959	1,679,350	14,491,461
1900	409,728,377	1,795,450	55,764,000
1901	451,598,420	3,384,050	16,821,750
1902	406,922,923	2,318,000	12,989,000
1903	458,555,122	1,216,000	22,438,000
1904	414,806,949	3,340,950	22,533,000

PERSONAL

Mr. R. G. Purvis has resigned his position with the Standard Oil Co. whose interest he has been looking after in connection with the completion of the large tank steamer Capt. A. F. Lucas which was building at the yard of the Wm. R. Trigg Co., Richmond, Va., at the time that that company went into the hands of a receiver. The Standard Oil Co. at that time bought the unfinished vessel and machinery and operated the yard to complete the vessel to the extent that she could be launched and towed to the Roach ship yard, Chester, Pa., where she was completed under the supervision of Mr. Purvis and left on her own steam for New York on Dec. 31 last. Mr. Purvis has accepted the position of assistant to the manager and general superintendent of the Craig ship yard, Toledo. He will therefore renew on the lakes the many attachments formed while he was with the old Union Dry Dock Co. at Buffalo prior to its absorption by the American Ship Building Co.

Governor-elect Higgins of New York has announced that he will appoint Nicholas Van Vranken Franchot of Olean as state superintendent of public works to succeed Charles S. Hand. Mr. Franchot is forty-eight years old. This office is especially important at this time as the superintendent of public works has charge of the award of contracts for the Erie canal barge canal.

William G. Mather, president of the Cleveland Cliffs Iron Co., and Capt. Samuel Mitchell of the Jackson Iron Co., will erect monuments at Negaunee, Mich., commemorative of the discovery of iron ore in the Lake Superior region.

President Roosevelt has appointed J. Hampton Moore of Philadelphia chief of the bureau of manufactures of the department of commerce and labor.

It is reported that the B. & O. railway will make nearly $20,000 worth of improvements to the docks at Lorain this winter.

CAPT. HIRAM SMITH RETIRES

Capt. Hiram Smith, who, for the past fifty years, has been a well-known figure about the docks in Buffalo, has resigned as manager of the Buffalo Ship Chandlery Supply Co. In relinquishing his position Capt. Smith said:

"I have seen many changes on the docks since I first began work on them, way back in March, 1856. I came here entirely unfamiliar with boats or shipping. At that time the biggest boat was the Great West. I can tell you she was a monster—carried 33,000 bu. of grain in one load. The average boat of those days carried 12,000 to 14,000 bu. of grain. The coming of the Great West was an event in marine history. Her cargo of 33,000 bu. was very large. Today, however, a captain comes into my office. 'Pretty near unloaded, captain?' is asked. 'Yes, I have been to four elevators now, and have two still to go to, with only 140,000 bu. of grain to be unloaded!'

"I remember that about that time one of the prominent men around the docks was Capt. Winslow. One day he said to me: 'Mr. Smith, you will live to see the day when the present sailing vessels and sidewheelers will be replaced entirely by steamboats, made of iron and steel.'

"That prediction was little heeded. But he himself lived to see the day when that condition of affairs existed. A captain at that time got from $40 to $60 a month wages, and a man before the mast $12 to $14. Now the seamen get more than the captains in those days."

STEAMER WATT AS AN ICE CRUSHER

Capt. Alex. Cunning of the tug Tomlinson performed a rather unusual feat at the port of Gladstone during the last week of navigation by using the steamer James Watt as an ice crusher to break her way through 18 in. of solid ice into that port to release the Steel Corporation steamer Charles R. Van Hise. Both steamers then cleared for Manitowoc where extensive boiler repairs will be made upon them. Through ice which has hitherto been regarded as impregnable by the ordinary ore carrying steamer Capt. Cunning piloted the Watt. Many times the heavy ice brought the big steamer to a standstill and several times she was forced to back over the channel that had been ploughed out and taking a new start again buck into the ice field. In making each turn into the Gladstone dock the Watt refused to break her way until a second charge was made, but under the direction of Capt. Cunning, who took the bridge, the heavy mass of steel became an ice crusher in reality as his experience had taught him to what extent the boat could be pushed without injury and which the master of the vessel would have been loath to do. Pushing her way through the great ice field several inches over a foot in thickness, throwing heavy blocks aside and with one of the worst blizzards of the season blowing the Watt presented a magnificent sight. With water ballast aft the bow of the Watt was raised so that she really slid forward upon the ice and broke it down by sheer weight after the manner of the regular ice crushers. As long as the force of the Watt was kept directly forward no trouble was experienced and an average of three miles an hour was made in the thickest ice. When an attempt was made to turn, however, the resistance of the ice field stretching over for more than a mile was brought to bear on the side of the boat it was then she was forced to reverse and moving back over her course cut off the offending corner of ice in order that the turn could be made. Capt. Cunning displayed great skill indeed in the way in which he maneuvered the vessel.

The barge John Forsyth, launched at the Thames ship yard, New London, Conn., for the F. H. & A. H. Chappell Co., is the largest barge constructed in Connecticut. It has a dead weight carrying capacity of 4,500 tons and was built to carry coal.

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MR. L. C. HANNA RETIRES

Mr. L. C. Hanna, who has been for the past ten years the active head of the firm of M. A. Hanna & Co., retired from active work on the first of the year after thirty years continuous connection with the company. No person on the great lakes achieved a more solid reputation than Mr. Hanna, who was recognized as an authority in the iron ore and vessel trades. His career was not as conspicuous as that of his more famous brother but in a business way he had been for years recognized as the real head of M. A. Hanna & Co. His retirement was largely influenced by poor health which has troubled him greatly during the past few years.

MR. L. C. HANNA.

Mr. Hanna was born in New Lisbon, Columbiana county, O., and was taken to Cleveland by his parents when a child. After he had completed his education he served as purser on a passenger steamer plying between Cleveland and Duluth. After M. A. Hanna had joined the firm of Rhodes & Co., which then consisted of R. R. Rhodes and J. F. Rhodes and Mr. Hanna, overtures were made to the younger brother to go into business with them. He, however, preferred to go into business for himself and accordingly went to St. Paul, Minn., where he engaged in the coal business in the years 1872-73-74. These years included the great panic of 1873 during which nearly all the business concerns of St. Paul were financially embarrassed. Mr. Hanna and his business associate, E. M. Saunders, managed, however, to weather the storms and were very successful. Mr. Saunders is still a resident of St. Paul and is one of its most prominent business men, being president of the Northwestern Fuel Co. and being connected with other enterprises. At the close of 1874 Mr. Hanna decided to return to Cleveland and on Jan. 1, 1875, became connected with the firm to which he was to give thirty years of service. He was admitted as a partner in 1879 and took direct charge of the iron ore and vessel business of the firm. No one on the great lakes became better posted than he on the iron industry and especially that part of it pertaining to the mining and transportation of ore. When his brother, M. A. Hanna, became a national figure politically ten or more years ago and began devoting a fair part of his time to public affairs, Mr. Hanna became the active head of the firm and has remained so ever since. During the decade just passed the volume of the firm's business increased with great rapidity and it has attained a position of great prominence in the iron and steel world. When the Bessemer Ore association was organized Mr. Hanna was elected its president and continued in that position for nine years until succeeded two years ago by Mr. W. G. Mather. It is commonly reported that throughout this long period the members of the association depended absolutely upon Mr. Hanna's judgment on ore matters. Disputes were frequently referred to him with the utmost confidence that his decision upon them would be just. While Mr. Hanna severs all active connection with the firm of M. A. Hanna & Co., he has so long been identified with various other interests that he will retain connection with some of them in order to keep his mind occupied.

NAMES OF THE GIANT STEAMERS

Of course special interest attaches to the names which are to be bestowed upon the new giant steamers that are to come out this year. Mr. Harry Coulby, president and general manager of the Pittsburg Steamship Co., has decided to name the four steamers building for the Steel Corporation in honor of four leading officials of the corporation. The two steamers which are building at South Chicago will be christened Elbert H. Gary and William E. Corey. The steamer building at West Superior will be named George W. Perkins and the one building at Bay City, Henry C. Frick. Mr. Gary is the chairman of the executive committee of the United States Steel Corporation, Mr. Corey is president, Mr. Perkins chairman of the finance committee and Mr. Frick is a member of the finance committee and probably the best known man in the United States who is now actively engaged in steel making.

The steamer building at the yard of the Great Lakes Engineering Works at Detroit for the Cleveland Cliffs Iron Co. will be named after William G. Mather, and the steamer building at that yard for the Presque Isle Transportation Co. will be named Peter White. Mr. Mather's name was spontaneously selected for this steamer by his board of directors without his knowledge. All these names are representative but especial significance attaches to the selection of the name of the Hon. Peter White at Marquette, Mich., for the Presque Isle company's steamers. Mr. White was a member of the first party that developed the first iron ore mine when iron ore was first discovered on the Marquette range. The bill-of-lading for the first shipment of this ore was in his handwriting and is now preserved in the office of Oglebay, Norton & Co., Cleveland. Since that first day he has been continuously identified with the commerce of the great lakes and has witnessed its development from small beginnings to its present immense proportions. Like Cæsar he can truly exclaim: "All of which I saw and part of which I was."

LENGTHENING OF STEAMERS

Two years ago when the steamer Republic was lengthened 72 ft. by the American Ship Building Co. at its Cleveland yard it was considered a rather unusual operation because no freight carrier had been lengthened heretofore on the lakes. The advent of the 10,000-ton ship, however, has led to some sober reflections on the part of owners of the smaller class of vessels and this winter sees the ship yards quite busy in

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lengthening a number of steamers that were two or three years ago regarded as modern. Some time ago the American Ship Building Co. received an order to lengthen the steamer C. J. Grammar 72 ft. This was followed with an order to lengthen the steamer S. S. Curry the same number of feet. When the Craig Ship Building Co., Toledo, received an order to lengthen the steamer Waldo 72 ft. and now during the past week the American Ship Building Co. has received instructions to lengthen the Savona, owned by James McBrier of Erie, Pa., 72 ft. and the Victory, owned by Pickands, Mather & Co. of Cleveland, 72 ft. The Savona will be lengthened at the Buffalo yard of the American Ship Building Co. and the Victory at the West Superior yard. The changes in these vessels will increase their carrying capacity from 1,300 to 1,600 tons according to their lengths.

MASTERS OF STEEL CORPORATION STEAMERS

The Pittsburg Steamship Co., through Mr. Harry Coulby, its president and general manager, has taken the lead this year in arranging its affairs with the men aboard ship. During the latter part of last week two conferences were held by Mr. Coulby with the masters of the steamers of the Pittsburg Steamship Co. The best of feeling prevailed and at the conclusion of the conference, contracts were entered into with the masters for the season of 1905 upon the basis of $1,980 for first-class steamers, $1,760 for second-class steamers and $1,540 for third-class steamers. The utmost frankness was expressed by Mr. Coulby in dealing with the men, saying that he desired to do the reasonable thing and that in return the company expected the utmost loyalty on the part of the men. The masters will this year be permitted to employ their own mates, subject to the approval of the company, but it is specifically reserved that mates belonging to a union shall not be employed. There has been no talk whatever of the masters endeavoring to revive the old Masters' & Pilots' association, but some of the mates have been agitating the question of establishing an organization of mates, and it is therefore with the intention of minimizing this movement that the company makes this reservation. Quite a number of masters have already signed mates and not a single report has so far been made to the company that any master is meeting with difficulty in getting mates. Following are the Pittsburg Steamship Co.'s appointments of the masters of steamers:

Steamers	Captains	Steamers	Captains
New boat 1	F. A. Bailey	Siemens	M. K. Chamberlain
New boat 2	Neil Campbell	Stephenson	W. B. McGregor
New boat 3	W. H. Moody	Superior City	F. J. Crowley
New boat 4	Richard Jollie	Van Hise	Fred Hoffman
Bessemer	W. S. Hoag	Watt	W. J. Hunt
Black	M. A. Boyce	Zenith City	H. Culp
Borgen	J. W. Morgan	Briton	George Holdridge
Cadillac	W. H. Campau	Corona	John Gemmel
Carnegie	W. H. Kilby	Corsica	H. J. Regan
Crescent City	Frank Rice	Cort	J. R. Noble
Davis	Arthur Montague	German	Robert Brooks
Edenborn	A. J. Talbot	Gilbert	E. Dyble
Edward Gray	C. H. Cummings	Grecian	Andrew Hansen
Empire City	A. R. Robinson	Manola	H. G. Harbottle
Harrison	E. O. Whitney	Mariska	H. Kerr
Hutchinson	C. J. Grant	Maruba	S. C. Watson
Isaac L. Ellwood	Clint Ennis	Matoa	H. Gegoux
Ogden	J. A. Walsh	Marina	A. C. Smith
Maryland	C. D. Secord	Masaba	C. A. Weitzman
Mesaba	George Bell	Maritana	J. R. Parker
Hutchinson	E. M. Smith	Mariposa	James Burr
Lafayette	D. P. Wright	Neilson	Oscar Olson
Lee	George Banker	Palmer	J. H. Clapp
Martha	John Parke	Roman	George Randolph
Victoria	R. F. Humble	Saxon	George Bowen
Wallace	J. Laframboise	Wolvin	A. R. Thompson
Wellman	A. C. Chapman	Cambria	T. J. Cullen
Wheeling	John Nahrstedt	Colgate	A. G. McLeod
Wilson	John B. Lowe	Griffin	E. L. Sawyer
Maley	James Leisk	Hoyt	S. J. Millen
Rockefeller	W. C. Ier	Joliet	W. E. Stover
Robertson	A. P. Chambers	LaSalle	Thomas Wilson
Gilchrist	C. Gegenheimer	Mather	C. S. Boyce
Bickerdike	S. C. Allen	Trevor	J. Ferguson
Peter Reiss	P. A. Petersen	Wawatam	J. C. Bell
Shaw	John Burns		

A new chart in colors of Manistee harbor has just been issued by the United States lake survey office and is for sale by the Marine Review.

MEETING WITH ENGINEERS

Conferences are now being held between the Pittsburg Steamship Co., represented by Mr. Harry Coulby, its president, and the engineers employed in the vessels of the company's fleet for the purpose of arriving at an agreement for the season of 1905. Last year the engineers presented their own schedule on a basis of $150 per month for first-class steamers, to be paid for time actually employed, and it was accepted by the company. Of course it is well known that the season was short and though the suggestion was the men's own several expressed dissatisfaction with their earnings at the end of the year. In meeting the men this week Mr. Coulby told them that he was disposed to be fair and was prepared to make contracts with them at once as individuals. He added, however, that if they desired to make contracts through their organization as a body it would have to be done through the Lake Carriers' association. He said that if the engineers chose the latter method the Pittsburg Steamship Co. would pay the schedule of wages fixed by the Lake Carriers' association which would apply impartially to all vessels enrolled in the association. The engineers are now considering the subject and are naturally divided upon it. Many of them believe that if they make contracts as individuals that they will fare better as the Pittsburg Steamship Co. is a generous employer, while others maintain that to make contracts as individuals would be to weaken their organization. Decision will, however, probably be reached this week.

CONFERENCE OF STEAMSHIP LINES

An important conference will be held with Secretary Metcalf of the department of commerce and labor in Washington on Jan. 16 by the steamship lines of the country. The changes recommended by the board of supervising inspectors in the regulations governing the inspection of steamboats will be discussed with the secretary by the representatives of the steamship lines. A number of these recommendations are quite objectionable; some of them are even impractical; and others would do more mischief than good. Conditions of service vary so greatly in this country owing to its wide extent that it is impossible to make regulations that can be impartially imposed in all parts of the country. The purpose of the steamship lines will be to endeavor to have a liberal interpretation placed upon some of the recommendations. A meeting of the lake passenger lines was held at Buffalo this week to discuss a number of features which are from the lake standpoint objectionable and a committee will present them to the secretary at the meeting in Washington.

SHIPMASTERS' ASSOCIATION

It is to be noted that the utmost good feeling prevails between the owners and masters of vessels since the strike of last spring. Especially is this noticeable in the desire of the owners to encourage the growth of the Shipmasters' association. The Shipmasters' association is, of course, not in any sense of the word a union and is not to be confounded with the Masters & Pilots' association which was purely a union. The Shipmasters' association is organized for social purposes and has done great good during its career. It consolidates both masters and owners and promotes good feeling all around and it is especially gratifying to the owners to see that the Shipmasters' association has not suffered during the year. The meetings of the association, which are being held in various cities along the lakes, are being very well attended indeed.

As a rule trains are not much delayed by the car ferries at Detroit but the storm last week was so severe that the big car ferry Lansdowne struggled for three hours against the wind to make a landing at the Windsor dock.

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The Merchant Marine League of the United States has prepared a careful analysis of the new shipping bill presented to congress this week as the fruit of the exhaustive inquiry made throughout the country last year by the Congressional Merchant Marine Commission. The League in its digest says that the measure is unlike the Frye-Hanna bill of several years ago and unlike any shipping legislation ever before framed in Washington. The keynote of the new measure is half naval, half commercial, as the title implies: "A bill to promote the national defense, to create a force of naval volunteers, to establish American ocean mail lines to foreign markets, to promote commerce and to provide revenue from tonnage."

In the very first leading paragraph the bill creates what the United States now almost altogether lacks—a sea militia composed of the skilled officers and men of our merchant ships and deep-sea fishing vessels—a force holding the same relation to the regular navy that is held toward the regular army by the state militia or national guard. There is a small so-called naval militia now, but its members are almost entirely landsmen. The new force will be made up of professional sailors capable of serving in any sea and in any clime. The bill authorizes the secretary of the navy and the secretary of commerce and labor to make an enrollment of such officers and men for a period of three years during which they shall be subject to render service on call of the president in time of war. As an inducement to enroll and a recognition of the peculiar value of an able-bodied seaman in the national defense, an annual retainer is provided ranging from $100 for a master or chief engineer of a large steamship to $25 for a seaman or fireman and $15 for a boy. Officers and men receiving this retainer must serve for at least six months out of the year in the foreign trade of deep-sea fisheries. This retainer to the seaman corresponds closely to the similar payment made by the British government to 30,000 members of the royal naval reserve. The retainer is in addition to the pay and allowances received by our naval volunteers while undergoing naval instruction according to the regulations which the secretary of the navy may prescribe.

In order to secure this sea militia there must be American ships on which American naval volunteers can earn their livelihood. Therefore section 2 of the bill provides for a naval subvention of $5 per gross registered ton to each vessel, steam or sail, which is engaged throughout the year in the foreign trade or the deep-sea fisheries; $4 for nine months, and $2.50 for six months. The vessels receiving this subvention are required to carry naval volunteers in the proportion of at least one-eighth of their crews until July 1, 1911; after July 1, 1911, one-sixth, and after July 1, 1916, one-fourth. It is provided also that these vessels may be taken and used by the United States at any time for the national defense or for any public purpose; that they shall carry free of charge the United States mails; that they shall maintain an efficient rating, and that they shall make all ordinary repairs in the United States where adequate dry docks are available. No vessel shall receive the naval subvention for a longer period than ten years.

The rate is a fixed even one of $5 per gross registered ton payable to steam vessels regardless of their speed and to sail vessels whether of square rig or fore and aft rig. There is therefore no chance here for favoritism or discrimination. One reason why the same subvention is given to sail vessels as to steam is that sail craft are requisite for the training of good seamen, and are therefore of peculiar value to the government. Any vessel of the United States engaged in the foreign trade or the deep-sea fisheries is eligible to this naval subvention if it complies with the requirements as to the carrying of naval volunteers, etc. This subvention applies especially to sail vessels and the ocean steam "tramp."

For fast steamers running in regular lines encouragement is given by other sections of the bill, which provides certain mail routes and authorizes the postmaster-general to make contracts as follows:

For a line from an Atlantic port to Brazil on steam-

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ships of at least 14-knot speed, for a monthly service, at a maximum compensation not exceeding $150,000 a year, or for a fortnightly service at a compensation not exceeding $300,000 a year.

2d. From an Atlantic port to Uruguay and Argentina on steamships of not less than 14 knots speed for a monthly service at $187,500 a year or a fortnightly service at $375,000 a year.

3d. From an Atlantic port to South Africa on steamships of not less than 12 knots speed, for a monthly service at $187,500 a year or a fortnightly service at $375,000 a year.

4th. From a Gulf port to Brazil, on steamships of not less than 12 knots speed, for a monthly service at $137,500 a year, or a fortnightly service at $275,000 a year.

5th. From a Gulf port to Cuba, on steamships of not less than 14 knots speed, for a semi-weekly service at $75,000 a year.

6th. From a Gulf port to Central America, on steamships of not less than 12 knots speed, for a weekly service at $75,000 a year.

7th. From a Gulf port to Mexico, on steamships of not less than 12 knots speed, for a weekly service at $50,000 a year.

8th. From a Pacific port via Hawaii to Japan, China and the Philippines, on steamships of not less than 16 knots speed, for a monthly service at $300,000 a year, or for a fortnightly service at $600,000 a year.

9th. From a Pacific port of the United States to Japan, China and the Philippines, on steamships of not less than 13 knots speed, for a monthly service at $210,000 a year, or for a fortnightly service at $420,000 a year.

10th. From a Pacific port to Mexico, Central America and the Isthmus of Panama, on steamships of not less than 12 knots speed, for a fortnightly service at $120,000 a year.

Nearly all of these are entirely new routes on which no American steamships now run, and in no case on these routes is there now a regular line of American steamers under contract with the government. The mail contracts with existing lines to Europe and elsewhere are left untouched by the new bill. Not one dollar is added to their compensation, and no provision is made for another fast mail line to Europe. The new lines named by this bill are to run to the West Indies, Central or South America, Africa or Asia, along natural lines of expanding American commerce. The speed requirement is moderate, but in every case it is believed to be sufficient, and the service can be performed by ships of large cargo capacity.

Three of the proposed new lines start from the Atlantic coast, four from the Gulf of Mexico, and three from ports of the Pacific ocean.

The fourth feature of this new shipping bill is an increase in the tonnage taxes on all ships, foreign or American, entering our ports in foreign trade. Our present tonnage taxes are the lowest of the great commercial nations—very much lower than the rates of most nations. On the other hand, the United States for many years has been expending far more money than any other nation in making improvements to its harbors, lighting its coast, and maintaining a life saving and marine hospital service. The present rate of tonnage duties is 6 cents a ton for five arrivals in a long voyage and 3 cents a ton for five arrivals in a short voyage in foreign trade. The increased rates are 16 cents a ton for ten arrivals in a long voyage, and 8 cents in a short voyage. This will produce a total revenue of about $3,000,000, and it will leave our tonnage taxes lower than those of France, Italy and several other nations. It is provided, moreover, that 80 per cent of the tonnage taxes shall be rebated to American vessels that carry boys trained in seamanship or engineering. This is following the British practice—the British government making such a rebate for the purpose of strengthening its naval reserve and mercantile marine. So that while much of the increased tonnage taxes will be paid by British ships, no remonstrance can reasonably be looked for from the British government.

Both the naval and the mail subventions provided for in the bill are payable only to vessels now registered in the United States or to vessels hereafter built here. The present postal aid law of 1891, under which several American steam lines are operating, is left in full force, except as to the new lines specified. Under the general provisions of existing law the mail contracts on these new lines are to be let to the lowest responsible bidder after public advertisement, and ships of 14 knots and upward performing a small service must be built under the inspection of the navy department with a view to their use as auxiliary cruisers in time of war. They must be of unusual strength and must be adapted to the carrying of batteries of heavy cannon. The speed required by the mail contracts is to be established by a four-hour run at sea under the supervision of a board of naval officers.

As to the cost of the new bill, it is estimated by the commission in its report that the naval retainers to officers and men and the naval subventions to the ships themselves will require from July 1, 1905, to June 30, 1906, the sum of $2,304,000. It is also estimated that for the first year the increased tonnage taxes will furnish a total revenue of $3,025,000, out of which there will be rebated to American vessels carrying the required quota of boys—naval volunteers and apprentices—the amount of $210,000, so that so far as the sea militia and the general commercial shipping is concerned, the whole cost of the bill and more will be covered by the provision for an increased revenue from tonnage. For the first year and for several years thereafter there will be no additional cost whatever to the treasury.

As to the new ocean routes, they will call for a

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maximum subvention of $2,565,000, but in the first year it is estimated that not more than one-fourth of the new mail routes can be filled, for many new ships will have to be constructed. It will probably take three years to build the ships and get all the new lines in operation. Unlike all other nations, the United States, because it pays so little money, relatively, to American ships, makes a large profit out of its ocean mail service. This profit last year was $2,579,000, or a sum a little larger than the ten new mail routes will require when they are finally established. In other words, this new shipping bill of the Merchant Marine Commission provides an increased revenue from tonnage taxes equivalent to the whole cost of the naval retainers and subventions; and, in the second place, utilizes for the creation of new mail routes and the extension of American commerce the profit that now accumulates from the ocean mail service. Thus the measure in its financial aspect is decidedly cautious and conservative.

The commission presents a second bill reserving to American ships the carrying of all the supplies, materials and machinery to be used in the construction of the Panama canal. Moreover, the commission accepts the suggestion of the commercial organizations of the central northwest which, while protesting against the present adoption of a discriminating duty policy, urges that such discrimination should be held in reserve and applied in retaliation against British ships in the "indirect trade," if the British government, following the Chamberlain plan, discriminates against American food stuffs.

The commission also recommends the abandonment of the transport service of the war department, and the carrying of troops and supplies to and from the Philippines in American merchant vessels as a measure of justice and economy. It is also urged that the commercial treaty that remains to be negotiated with Cuba should contain a clause reserving to American or Cuban ships the merchandise that receives the benefits of reciprocity reductions in the two countries.

Finally the commission asks congress to authorize a special inquiry into the problem of fast mail steamship communication on the north Atlantic, where the Cunard Line has lately received an immense subsidy from the British government, and steamships engined on the turbine principle are about to be introduced.

The commission urges emphatically that the legislation which it recommends shall be enacted at the present session of congress. "If the passage of the legislation proposed by the commission is postponed to the next session of congress," says the report, "a condition already desperate will have become still more desperate. The time to act is now."

The annual meeting of the Lumber Carriers' association of the great lakes will be held in Detroit on Tuesday next and the annual meeting of the Lake Carriers' association will convene on Thursday next.

AROUND THE GREAT LAKES

Last week's storm broke up the ice in Sheboygan harbor and the undertow caused thereby tore several vessels loose from their moorings. Among the vessels that broke loose were the barge Abyssinia, the steam barge Susie Chipman and the tug Louise M. For some time the destruction of the Eighth street bridge was threatened.

The wreck of the steamer Minnesota which was burned on Nov. 18, 1903, and sank in the south channel of the river St. Clair almost directly in the alignment of Russel Island range light, about 400 yards below Grand Point hotel wharf, has been removed under contract with the government of Canada. There is a depth of 24 ft. over the wreck and it is no longer an obstruction to navigation.

The Marine Engineers' Beneficial association No. 53 of Marine City, Mich., elected officers on Dec. 31 for the ensuing year as follows: President, Wm. Conley; vice-president, George Love; recording secretary, H. U. Bell; financial secretary, E. H. Hill; corresponding secretary, H. Stone; treasurer, H. Stone; chaplain, John McNamara; conductor, Wm. Sicken, doorkeeper, Henry Minnie; delegate to national convention, A. A. Manion; alternate to national convention, John Conley.

The annual meeting of the Cleveland lodge of the Shipmasters' association was held last week and the following officers were elected: President, Capt. William D. Ames; first vice president, Capt. H. T. Kelley; second vice president, Capt. C. R. Cleveland; treasurer, Capt. Thomas Jones; secretary, Capt. Carlton Graves; delegate to the grand lodge, Capt. W. D. Ames. It has not been decided when the grand lodge meeting will be held, but the delegates will probably meet at Washington next month. Capt. Ames, the new president of the lodge, was master of the big steamer Sahara of the Tomlinson fleet last season. Capt. Jones, who was re-elected treasurer, is also treasurer of the grand lodge.

Chicago's lake trade shows a considerable decrease during the year just closed. Grain shipments for the year amounted to 56,599,696 bu., against 103,901,438 bu. in 1903, a decrease of 45 per cent. Receipts of coal were 1,016,696 to Dec. 10, against 1,250,610 tons in 1903, a falling off of 19 per cent. Lumber receipts were 385,833,000 ft., against 456,198,000 ft. in 1903 and 638,394,000 ft. in 1902. The lumber traffic, for years the heaviest in volume entering the port, is decreasing naturally through the cutting of forests adjacent to the lakes and the extensions of railroad lines. Iron ore receipts were small for nearly the entire season because of the depression to the iron and steel industries; in the two closing months they were as large as usual. In the year 2,567,840 tons of iron ore came to Chicago, against 3,232,293 tons in 1903, a decrease of 20 per cent.

A NEW COAL COMPANY

Mr. Joseph Johnston, who has been for a number of years connected with the firm of M. A. Hanna & Co. as the secretary of the Wheeling & Lake Erie Coal Mining Co., and Mr. C. L. Ayers, who has also been connected with the coal department of the firm of M. A. Hanna & Co. as its selling agent, have formed the Johnston-Ayers Coal Co. and will engage generally in the coal business. Prior to his connection with the firm of M. A. Hanna & Co. Mr. Ayers had been connected with the Drake Coal Co. Both of these men have in fact had large experience in the coal business. And it is predicted that they will be successful in their new venture.

Capt. James S. Parsons, a lake vessel master, died at Los Angeles, Cal., last week. He was born in Newport, England, in 1838 and was brought to this country by his parents four years later. He sailed the great lakes for over forty years.

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MAINTENANCE OF MACHINERY IN MERCHANT SHIPS

At the annual meeting of the Society of Naval Architects and Marine Engineers which was held in New York recently Mr. Robert Haig, who is Lloyds' surveyor at Philadelphia, read an invaluable paper upon the subject, "Maintenance of Machinery in Merchant Ships." It was vigorously discussed and was as follows:

"The maintenance of machinery in merchant ships is a problem that is steadily becoming of higher importance by reason of the increase in size and power, the greater complexity and detail now found on board high-class vessels, and also because of the greater demands now made for a higher efficiency in the machinery, and the personnel of the engineering staffs afloat and ashore. The present day ships call for engineers of wide experience, men of good education, who have had a thorough practical training for their business, combined with sufficient theory to enable them to appreciate heat losses, combustion, feed heating, electrical and refrigerating installations, and the many other duties that go to make up the experienced engineer, in whose hands in conjunction with the shore engineer superintendent the maintenance of valuable shipping property is entrusted. In dealing with this subject there will also be considered the various changes, improvements and developments that experience gained in maintenance has brought about.

"Engine Foundations.—The practice now usually followed where a vessel is fitted with a double bottom is to put the engines right down on the tank-top, the scantlings of the inner bottom having been made heavier for that purpose. Formerly it was the practice to build a seating of deep girders and intercostals securely riveted and bracketed to the tank-top plating and the framing underneath. This made a very satisfactory foundation when well built, and it had the further advantage that the heads of the holding-down bolts could always be got at. The ruling practice at present, however, is to put the engines down on the tank-top plating, and it is here very serious trouble is met with by holding-down bolts breaking and becoming loose, by engines working on the seating and causing serious trouble, and this will always ensue unless the highest quality of workmanship is put into the double bottom in the machinery space. It is not suggested that placing the engines down on the tank-top is an inferior arrangement to the built-up seating; it is only inferior when adequate provision has not been made for strengthening the tank-top and double bottom at this part.

"As is well known the scantlings of the double bottom in the machinery spaces are considerably increased, double reverse frame-bars are fitted, and altogether the double bottom at this part is, or should be, of superior construction to what is required at other parts of the vessel. It is but rarely, however, that the material fails; the usual trouble is from bad workmanship, such as unfair holes and bad riveting produce, and that in a place where nothing but the best possible workmanship will stand. The intercostals should be well fitted; the rivet holes should be absolutely fair; the countersinking of the holes in the tank-top plating should be almost, if not the entire, depth of the plating, and the rivets laid up with good full points, so as to ensure a thoroughly strong connection. When we consider what a pull must come on this work when the engines are swinging about, it will be seen how very necessary it is that the holding-down bolts should take hold of a good foundation.

"Care should be taken in spacing the holding-down bolts that they go straight down, not at an angle (Fig. 1); also that they do not come down on the heel of the frame-bars, as in that case they have to be tapped into the top plating without being reinforced with a nut underneath, and it is these unfair bolts that are most frequently broken in working; and, unfortunately, broken and loose-holding down bolts are altogether too common. As so much of the successful working of the engines depends upon the design and workmanship of the engine seating and fastenings, the vital importance of this point cannot be too highly rated, nor the demand for good workmanship too rigidly enforced.

Shafting.—Although last winter was one of the most severe of recent years, the number of broken crank shafts was comparatively few when compared with the failures of past years, and this is not surprising and can readily be explained by the higher quality of material of which shafts are now made, by the increased attention given to the bearings and keeping of the shafts in alignment, and also no doubt to the improved design and construction of the engine bed-plates foundations. Although for very sufficient reasons solid crank shafts are still used in warships, they are in merchant ships a thing of the past, and we have instead built crank shafts of nickel and carbon steels of the highest quality, well designed and constructed, with the result that broken crank shafts are exceedingly rare. In the early days of built shafts no doubt there were many failures, and loose crank pins and unfair shafts were common, but higher quality of material, greater experience and accuracy in machining, improved methods and knowledge of shrinking the various members together, have resulted in producing shafts as nearly mechanically perfect as could be desired. Built shafts are heavier, but that is of little importance in merchant ships, when compared with the higher quality of shaft, lower cost of manufacture and also the very much reduced time required to renew.

PROPELLER SHAFT TROUBLES.

"Propeller shaft troubles have been numerous and their maintenance comes very high, by reason of the delay caused by repairs, cost of docking, etc. If we had only the torsional stresses set up by the power transmitted from the engines to deal with, this could be readily met by increasing the size of the shaft until the weakness was overcome; but a brief analysis will show that the stresses borne by the propeller shafts are of a widely varying nature. We have the stresses set up by the overhung weight of the propeller which in some cases reaches 25 tons, also the bending stresses due to the change of the center of effort brought about by the continuous variation in the immersion of the propeller, and which reaches its maximum when a vessel is pitching heavily or in a more or less light condition, and, further, the abnormal stresses developed by the rapid acceleration and as sudden retardation of the momentum of the propeller when the engines are racing, all combine to produce conditions that demand a very high degree of efficiency both in the material and workmanship of the propeller shaft and stern bearings. There is the further troublesome factor to be considered, namely, the wastage on the propeller shaft at the ends of the brass sleeves due to the so-called galvanic action or fatigue, but happily this latter feature of the trouble has been to a large extent eliminated of late by protecting the shaft with brass sleeves for its entire length, thus doing away with what has hitherto been a serious menace to the life of propeller shafts.

"In some cases the brass sleeves are put on in one length, which course is much to be desired, but where the shafts are long and the sleeves require to be built up of several lengths the greatest care should be observed to have the joints of the sleeves, perfectly watertight, as leakage at these parts causes scoring, and the shaft may rapidly become unsound without giving any outward evidence of the fact. Considerable success has been attained by running propeller-shafts without any

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brass sleeves whatever; the stern-tube being sealed at the outer end by a patented arrangement, which allows for the stern-tube being filled with oil. White metal is fitted into the stern brush instead of the ordinary lignumvitæ and the stern-tube being filled with oil, this makes an oil bath for the shaft and bearing and reduces wear and tear to a minimum.

"Under these conditions the steamship Clematis was in commission for five years and nine months, in which time the vessel steamed a distance of 156,000 miles, and when the shaft was drawn for examination the wear on the stern bearing was found not to exceed 1-16 of an inch and on the shaft it was practically nil, with the surface of the shaft preserved clean and bright and free from any wastage. The arrangement of running shafts without any brass sleeves also allows for a shaft of larger diameter being used without increasing the size of the stern-tube. Greater attention is now given to the stern bearings of ships by increasing the length of the bearing and also by keeping the shafts better in line. In some long ships of high power flexible couplings have been fitted in the line shafting, generally one at either end, to relieve the stresses due to bending or other movement of the ship's structure.

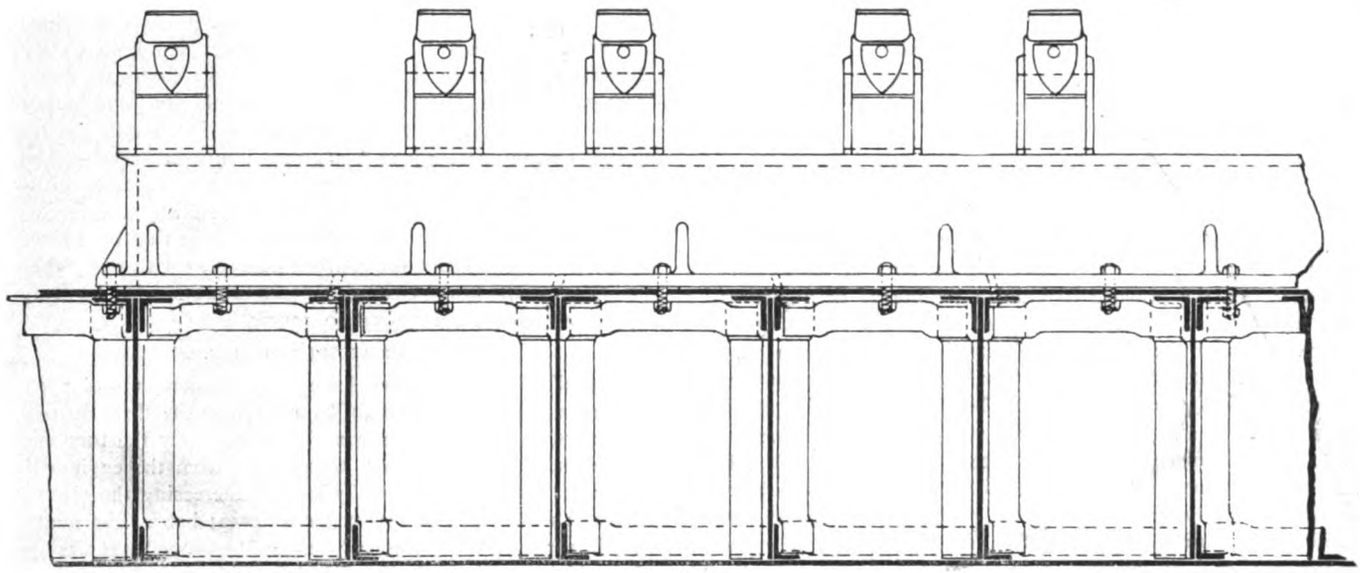
"These couplings have not been very widely adopted as many engineers fail to see the utility of them, and unless of the very best make their bearing surfaces wear rapidly and by their looseness cause considerable noise and jar when the engines are running at unequal speeds. There is no doubt that these couplings allow the shafting to accommodate itself to any movement that may take place, in a way that could not be obtained if the couplings were held rigidly together as in the ordinary practice, but judging from the comparatively smaller number of ships that are fitted with flexible couplings, it would seem there was no great need for them, and probably the fault they are supposed to remedy could be reached in some less expensive manner, as the first cost of these couplings is considerable, although their maintenance is not by any means great.

"Condenser.—The condenser seems to be the part of the machine that has changed least with the evolution of the present day marine engine. The principal change has been that the condenser has been detached from the main structure of the engines and is now in many cases being carried higher up on a built-up seating, which arrangement allows for better drainage to the air pumps, easier leads for inlet and discharge piping, and also gives greater access for overhauling the main engines. Surface condensers, which are really now the only condensers we may consider in marine work, have serious troubles from leaking and faulty tubes. Steamship owners and other authorities have spent considerable time and money in experimenting with the various kinds of tubes, but so far the results have neither been very encouraging nor satisfactory.

"The trouble usually found is that after a short time in use the insides of the tubes are found to be eaten away in spots, and pin-holed, as if some active erosive action had been taking place and had attacked certain parts of the material, which is evidence enough to some minds that the tubes are not altogether homogeneous. The various methods of packing condenser tubes have undergone little change, the screwed-in gland being what is now most commonly used, but the materials used in packing the tube ends have changed frequently and have given considerable trouble.

"Rubber rings, fibre rings, waxed cotton lacing, and lacing soaked in linseed oil have all been tried in turn, but experience has shown that lacing soaked in oil and properly packed in place makes the most satisfactory job and lasts well under the various changes of temperature. Wooden ferrules soaked in oil and driven into the tube plate makes a much cheaper method of packing a condenser, but has this disadvantage, that if the vessel should be laid up and the condenser remain dry for a length of time the ferrules shrink and split, and before the condenser can be made tight the ferrules require to be renewed. The packing of condensers is generally supposed to be a simple operation, not requiring any great skill or experience, but the results of hurried and imperfectly packed condensers are frequent sources of delay and trouble with feed water when at sea, and I am strongly of opinion that the greatest care and attention should be given to the operation of packing, and when the condenser is filled for testing, it should be with warm water of a temperature not less than 200 degrees F. Although

Fig. 1.



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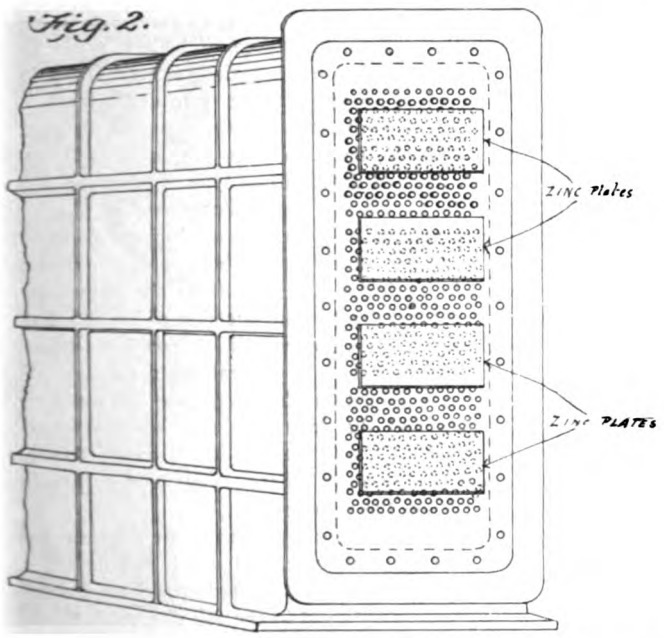
the packing of condensers properly is of the greatest importance the burden of the condenser trouble is without a doubt in the material of the tubes, in their inability to withstand the deterioration, which is admittedly serious, and more so now than in the past in view of the early probability of a more general use of water-tube boilers, as in that case the necessity of a pure feed water is beyond question.

LEAKAGE OF ELECTRIC CURRENT.

"Various reasons have been advanced to account for con-

Fig. 2.



denser troubles, the most prominent theory being the leakage of electric current from the electric generating plant on board, or the galvanic action set up by other conditions existing on board the vessel. A further reason given is the bad quality of the stream of water sent through the tubes when the vessel is docking, or proceeding up or down a river. Dealing with the last reason first, close observation of the conditions that exist when a vessel is docking will show that great quantities of globules rise to the surface of the water, giving off sulphuretted hydrogen and other gases, the liberation of these gases being caused by the churning of the water due to the propeller working ahead and astern.

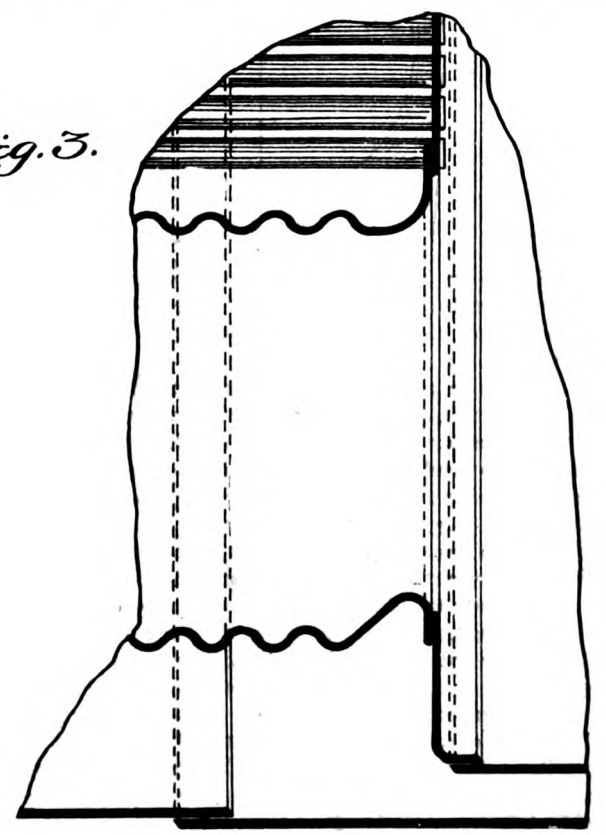
"Granted the observed conditions of the water in docking, it is reasonable to suppose that even worse conditions may easily prevail in the condenser. Tracing the path of the water upon entering the ship, it is split up into fine streams in passing through the sieve-like grating on the ship's side coming together again in the inlet pipe, then being broken up again by the action of the fan of the centrifugal pump and finally being split up again into small streams in passing through the tubes. Starting with the assumption that the water in which the vessel is lying is contaminated with sewerage and other foul matter usually found in river water near large cities, this breaking up of the water on its passage to and through the condenser in an increasingly heated state, is bound to produce conditions inimicable to the life of the tubes, the worst feature being that when the circulating pump is brought to rest, this foul and active matter remains in the tubes until the vessel leaves port, during which time I am firmly convinced most of the mischief occurs. If some simple means were adopted for washing out and draining the condensers as soon as practicable after the vessel is docked it would amply repay for the trouble taken.

"The claim that electric leakage is a cause of the deterioration in condenser-tubes is one that has given rise to widely different opinions ('Corrosion of Condenser Tubes,' Trans. to N. A., Vol. XLIV) for the reason that the trouble has been quite as acute in ships without any electric generating plant, nor does it seem to make any appreciable difference whether the vessel is wired on the single or double-wired system. While able reasons have been advanced in support of the theory that the return currents in the single-wired system, or stray currents from defective insulation and connections in the double-wired systems, should be accepted as the cause of deterioration in condenser-tubes, it is at present difficult to take this as being the only cause; there does not seem any reason why the electric current should single out the tubes for attack when there are other metals of almost the same compositions, exposed to the same conditions, and yet do not suffer to anything like the same extent.

"Condenser tube plates sometimes show a slight scoring or corrosion in more or less vertical lines, but that is always on the steam side and seldom amounts to anything, and is generally attributed to the acids set free from the grease brought in with the exhaust steam. The composition of the material of the tubes seem to have little bearing on the subject, as they nearly all seem to suffer alike. Of course it is recognized that, although an electric current of itself may not attack the tubes, the effect of an electrical current passing through certain liquids is to split them up and set free corrosive elements from what may otherwise be a comparatively harmless liquid.

If we consider the conditions of the water in the engine room and stokehold bilges, which is a solution of fatty acids,

Fig. 3.



fresh water, salt water, drainage from hot ashes and all other sources, and in which the various metals are brought in contact, it is reasonable to expect some galvanic action to take place on the fittings so exposed, and such has been found to be the case to quite a considerable extent in some instances. In some ships corrosion in copper and other pipes in the bilges has been traced to the use of certain animal or vegetable oils, but up to the present little definite progress has been made in determining the cause of the trouble in condensers (Trans. I. N. A., Vol. XLV, Corrosion in Metal Pipes), and although

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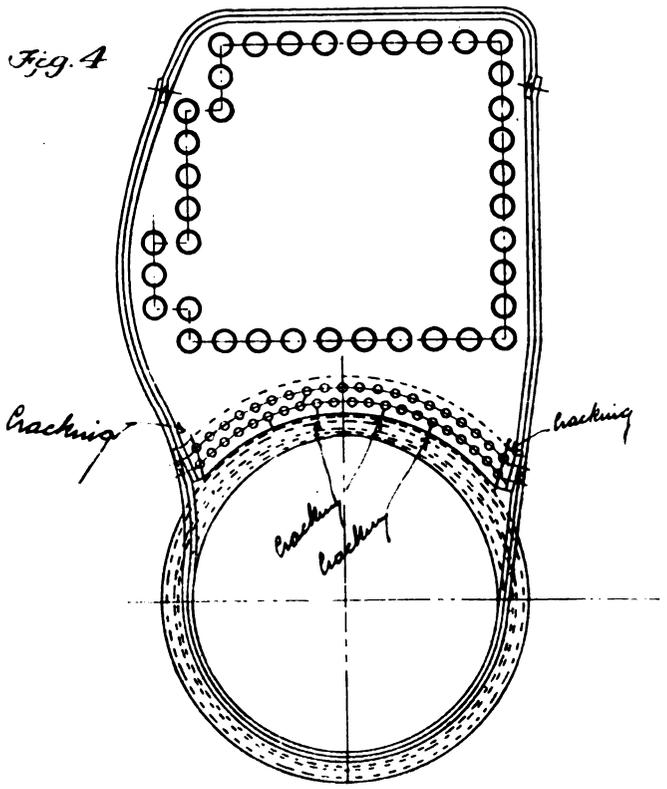
further investigation may disclose causes not yet ascertained the theory of electric leakage from the generating current cannot of itself at present be accepted as the only cause of condenser trouble, but it is conceivable that, with a condenser having water lying in it highly charged with decomposed matter, conditions could be produced from a combination of causes resulting in action on the material of the tubes. Whether

Fig. 4



electric leakage is the cause or only a contributory cause, the fact remains that condenser troubles have become increasingly frequent since electricity came into more general use on board ships.

"If it can be established that condenser troubles are due to electric current, generated from any source whatever outside of the condenser, it does not appear that it would be an impossible task to insulate the condenser in some manner and so protect it from such attacks. The use of oil in cylinder lubrication that may be carried into the condenser with the exhaust steam has little connection with the question, as mineral oils are now almost exclusively used, and further, the defect is most always found to proceed from the interior of the tubes. The working conditions of condensers have not changed proportionately with the shortened life of the tubes, and it is contended that if one part of the tube remains good there is every reason to expect the whole tube to remain uniformly good if the process of manufacture is all that could be desired. Homogeneity is a word much believed in by metallurgists and engineers, but, after all, it is only a comparative term and has wide definitions. It is admitted in the very fullest sense that the tube makers have given this matter very considerable attention, and it is hoped they will continue to do so, as there is still something to be done in the way of producing a tube that will come up to the requirements and so rid ship owners of what has been a source of vexation and delay, and also a costly item of maintenance.

"Numerous devices have been adopted to counteract the deterioration in the tubes, and the most successful has been to line the water ends of the condensers with rolled zinc plates on studs fitted in the tube plates (Fig. 2). This has been found to improve conditions quite considerably, but is not by any means a panacea for the ills that condensers are heir to, and which will only be arrived at by continued and persistent effort.

THE SUBJECT OF BOILERS DISCUSSED.

"Boilers.—In dealing with the present high pressure Scotch boiler it will be generally agreed that it has now reached its limit in size, thickness of plating and pressure, and although a few boilers of reduced diameter have been built for pressures up to 267 lbs. per square inch, the pressure that is found in most general use in our latest boats range from 200 to 215 lbs. per square inch. The maintenance of boilers with the higher pressures now in use has not materially altered from the conditions existing when lower pressures were dealt with, so long as the conditions of combustion are the same, or, in other words, with natural draft; but as a large proportion of ships are now fitted with assisted draft of one type or another, it is considered desirable to discuss the maintenance of boilers under forced draft conditions. Experience has undoubtedly shown that the working conditions of boilers under forced draft, can be made radically different from the conditions which exist under natural draft. The question of forced draft will be dealt with later on; at present it is proposed to discuss the effects on the boilers only. In natural draft we have the temperatures in the combustion chambers due to energetic working of the fires and the draft produced by the funnel, which at no time becomes so excessive as to cause damage to the chamber plates, unless the boilers are allowed to become very dirty from scale on the water side.

"With forced draft we have temperatures in the furnaces and chambers of much greater intensity, and which are only limited by the amount of coal capable of being burned on the firegrate and the air pressure obtained in the ash pits, with the result that the combustion chamber-plating becomes locally overheated and buckling takes place; stay-nuts are burned off, tube ends leak, and the plating cracks through the landing edges of the rivet holes, and this is especially severe in places where any broad landings or doublings are exposed to the flames. Various means have been adopted to protect the surfaces at the back ends, mostly affected by the flame, by fitting tiles made of fire clay or other refractory material and molded to the shape required, but their usefulness is sometimes of short duration, owing to the difficulty of keeping them in place, as the means taken to secure them are rapidly burned off. The most serious trouble met with is in the corners of the furnace plating where it is flanged up to take the back tube plate, and here, unless the radius of the flanging of the tube plate has been of an easy nature, cracking very soon develops, and as this takes place through a riveted connection, to repair which a three-ply thickness of material will be necessary in places, and which it is found is an impossibility to keep tight in boilers under forced draft conditions. It is true this weakness has been somewhat modified by the adoption of the furnace with the 'Gourlay' neck (Fig. 3), but even with this improvement the difficulty experienced in keeping this joint tight is quite acute, as the riveting and caulking requires frequent renewal, and each time it becomes more serious than before by reason of the deterioration of the material causing cracking through the rivet holes and landings.

"That this weakness is a common experience it can be abundantly proven, where a boiler is subjected to a high air pressure for a length of time the invariable result is distortion, cracking and leakage.

"The radius of flanging at the sides of the tube plates to which the furnace back end is riveted should be sufficiently great to allow the plating to be properly laid up and a good riveted connection made without resorting to the use of tap-bolts and other such makeshifts.

"The other most frequent weakness is shown in the riveting

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of the furnace to the back tube plate, right over the furnace crown. (Fig. 4.)

"This joint is in many cases double riveted, and with two thicknesses of material of a breadth sufficient for a double-riveted joint exposed to the hottest part of the flame, it is found extremely difficult to keep it tight, as the part of the plating exposed becomes overheated and weakened and the movement resulting from this overheating gives rise to extensive leakage. A single-riveted joint has been found to stand perfectly well at this part, and there is no good reason why it should not do so if the spacing of the riveting is properly designed and the work is of the best. It is at this part that protection as previously referred to by fire-brick blocks is urgently required, and when the voyage is short and the blocks can be frequently renewed they are an undoubted benefit.

"In the steamship Finland the builders had the whole of the combustion chambers of one boiler welded throughout, the only riveting being the attachment of the furnace to the back tube plates.

"This was found to be a highly satisfactory job and has not, I understand, given any trouble whatever, the increased cost, I think, being the only objectionable feature.

"In the case of the nuts of stay-bolts being burned off, this has been met by doing away with the nuts on the stay ends that come in a direct line with the furnace, and reverting back to the old practice of riveting the stay ends over which has been found to answer very well. As the maintenance of boilers has become a serious consideration, it cannot be too strongly pointed out that experience and common sense are just as essential in designing a boiler as it is to get the maximum amount of heating surface into the minimum size of shell. Many boilers are so designed that they are crowded, too closely pitched stays in the steam space, tubes brought close out to the wings and down on the top of the furnaces, with a result that the boiler cannot either be properly cleaned or examined, circulation is retarded, priming is common, and altogether the working conditions of the boiler are unsatisfactory; and further, where such conditions exist, corrosion is always active.

UNEQUAL STRESSES TO BE CARED FOR.

"If we consider the various elements that go to make up the ordinary cylindrical or Scotch boiler it will be recognized that we have a mass of unequal stresses to be taken care of, each stress tending to a movement in the structure and each movement meaning so much fatigue to the material which in time culminates in leakage and possibly rupture. The evidences of distortion most commonly met with are: (1) Cracking set up in the flanging of the back tube plate and furnace connections at this part. (2) Cracking in the furnaces at the line of fire-bars in a longitudinal direction. (3) Cracking on the knuckle of the flanging of the lower front heads and also in the case of double-ended boilers the tendency to rupture of the plating through the line of rivets in the circumferential seams at the bottom of the boiler.

"(1) This is caused by the unequal expansion of the furnace and the tube plate due to the upper half of the furnace being so much hotter than the lower half, and also to the impact of the flame on the tube plate joint where there are two thicknesses of material which does not allow of the heat being readily absorbed by the water. It is fair to assume that in the case of the back tube plate, perforated with holes and unsupported as it is, that there is considerable distortion as is shown by the leaky tube ends and riveted connections and also not infrequently by cracked tube plates.

"This movement, however, may not be altogether due to the change of form in the tube plate alone, but is doubtless caused by the action of the furnaces under the varying temperatures to which they are continually subjected, but that the movement is positive and actual has been demonstrated beyond a doubt, both under working conditions and by careful experiment. Mr. Yarrow conducted a series of experiments in 1891 (Trans. I. N. A., Vol. XXXII, p. 98), and showed conclusively that with every change in temperature the conditions of the tube plate and connections changed proportionately. At a later date Mr. Milton, chief engineer surveyor to Lloyds' Register, submitted the results of a considerable number of tests (Trans. I. N. A., Vol. XXXIV, p. 157), made by hydrostatic pressure on the various types of marine boilers, and in every case movement of the boiler took place when under pressure.

"A case occurred quite recently with one of the most eminent and best equipped builders in this country, when the question arose as to whether any vertical movement of the combustion chambers took place when under pressure, it being contended that if no movement took place, it would not be necessary to stay the chamber bottoms to the shell. The boiler was an ordinary double-ended high pressure boiler. To take the actual measurements a hole was drilled in the bottom of the shell into which a small watertight gland was fitted with a rod passing through and abutting against the bottom of the middle chamber. The rod was carefully marked when the boiler was completely full of water, but without any pressure. A steady pressure was then applied from accumulators on the premises and at 40 per cent. in excess of the working pressure the test was stopped as it was found the distance between the bottom of the shell and the chamber bottom had increased 7-16 of an inch. How much the movement would have been if the pressure had been allowed to go up to twice the working pressure can only be assumed; perhaps some of the wing stays would have given out, but the builders wisely accepted the results and decided to fit the stays.

LEAKAGE CAUSED BY LOW TEMPERATURE.

"Further evidence has been obtained of like results under actual working conditions. The chief engineer of one of the large mail boats sailing out of this port furnished me with data showing that if the cleaning of a fire could be kept within a certain number of minutes no bad effects to the tube plate and furnace joints were observable; but when from dirty fires or other reasons the operation was protracted beyond the stated time leakage would commence and continue until the fire was well under way again. He also informed me, and this I personally observed, that where this leakage had taken place, careful inspection showed that the caulking had been sprung by the lowered temperature, causing local contraction in the furnace and combustion chamber connections.

"The experiment was tried by putting two men to clean a fire so as to reduce the time required, and the results showed beyond a shadow of doubt that the leakage was directly due and proportional to the length of time the furnace door was open.

"(2) This is usually observed after the furnaces have been in use for some time, and is generally found to develop about the middle of the length of the furnace in small hair-like cracks showing up on the points of the corrugations nearest to the fire. These faint cracks steadily increase in length and extend into one another until they become so bad that they require to be pinned or the furnace removed altogether.

"The cracks in the furnaces are undoubted evidences of fatigue, produced from the stresses set up in a vertical direction by the unequal expansion and continuous movement due to the change of temperature, between the upper and lower halves of the furnace, and localized along the line of fire bars where the furnace is weakest, owing to the intense heat and excessive wear at this part. Cracks of a more serious nature sometimes develop in a circumferential direction in furnaces; this is not due to fatigue, but rather to carelessness in manipulation of the boilers.

"A case came under the writer's notice some time ago where

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in a vessel the morning after arrival in port, upon the engineer's proceeding to examine one of the main boilers, that had been blown down twenty-four hours previously, they discovered a crack 20° long in a circumferential direction in one of the lower furnaces. The cracked furnace was temporarily repaired, and upon the vessel's return to this country two months afterwards a crack of similar size was found under precisely the same conditions in one of the other boilers.

"Inquiry elicited the fact that it was the practice to lay off for cleaning purposes one of the boilers in rotation, while the vessel was in port on this side, the 'modus operandi' being to draw fires, blow down the boiler and drop in the manhole doors as soon as practicable after the vessel was made fast in dock.

"It was pointed out to the engineer that this mishap was altogether preventable and was due to a lack of appreciation of the care necessary in handling boilers. The conditions were simply that the boiler in a limited space of time had all the heat and internal pressure removed and the empty boiler was then exposed to the chilling effect of a 36-in. down-take ventilator discharging in front of the boiler air of a temperature near to freezing point as it so happened that it was in the winter months that the damage occurred.

"Arrangements were made that in the future, upon the fires being drawn, the furnace door and ash-pit dampers should be closed, the ventilators turned back to wind and the water left in the boilers to be pumped out next day, and since this has been done no further trouble with the furnaces has been experienced, clearly demonstrating how urgent the necessity is for a better appreciation of the care requisite in dealing with boilers.

"(3) Cracking in the knuckle of the flanging of the lower front heads and distortion of the boiler bottoms is in some cases a serious trouble from the very start, due in a great measure to design. These stresses at these parts are very severe indeed, in some cases causing rupture of the shell plating through the line of circumferential riveting in the bottom of the shell and cracking along the knuckle of the flanged part in the lower head. Investigation has demonstrated that to the differences of temperature between the top and the bottom of the boiler, causing unequal expansion of the shell-plating and boiler ends, is due the distortion previously mentioned. Leakage at the boiler bottoms is difficult to cure, as heavy plating and rivets cannot be efficiently laid up by hand, and least of all in a confined space under a boiler bottom.

KEEPING BOILERS FREE FROM SCALE AND DIRT.

"The flanging of the lower heads when examined inside show fatigue markings similar to the finer cracks shown on the fire side of the furnaces, and these in time develop upon the outside of the flanging also, and become so serious as to require the lower head to be repaired or renewed.

"This cracking is found to develop at an early date in boilers where the flanging is of a small radius showing that the plate in its efforts to accommodate itself to the changes of temperature and the movement resulting thereupon had been distressed, and of course where the material is fatigued to this extent there is a known limit to its endurance.

"The lower heads also suffer from wasting caused by the water draining from the hot ashes corroding the fronts of the boilers. This, however, is to a great degree preventable and can be taken care of.

"The lower heads as a result of the excessive flanging done upon them are peculiarly susceptible to corrosion on the knuckle of the flanging, and where this wasting is allowed to go on fatigue of the material follows very rapidly, and where rupture takes place at this part it is a difficult and costly business to repair, coupled with the fact that it can never be kept tight.

"Boiler making has become a science of considerable exactitude, and with the excellent materials and tools now in use there can be no excuse for bad boiler work.

"If boiler shells were ideally circular and could be kept so, if the flat surfaces could be so stayed that the various forces were balanced at all stages, then ideal conditions would have been obtained; but as the shell is distorted from its true form by various internal stresses, such as staying compensation for hole cutting, etc., the end plates which are so widely dissimilar in the areas under pressure, that the staying can only approximately meet the stresses, shows, and that very forcibly, how vitally important it is that all the possible conditions should be carefully thought out and amply provided for in a boiler design.

"It cannot be too strongly urged how desirable it is that boilers should be kept free from scale and dirt.

"Incrustation and corrosion go hand in hand. It is seldom that scale is removed without disclosing oxidation.

"Stromeyer estimates that scale offers one hundred times as much resistance to the passage of heat as an ordinary steel plate of the same thickness, while a film of grease shows a resistance ten times even greater than scale, and as scale found in marine boilers always contains a certain proportion of grease, it is at once evident how serious the deterioration in a boiler may become when working under these conditions.

"Good design or the best class of workmanship count for little if the boilers are allowed to get dirty and form scale, plating, bulges, furnaces collapse, tubes leak, and all from causes that care and attention would in most cases have obviated.

"At present many owners consider it cheaper wherever possible to use fresh water altogether for the boilers, rather than meet higher coal bills and the expense of scaling. Grease deposits in boilers have been to a large extent eliminated by the use of filters, and also from the disuse of cylinder and piston rod lubrication to a large extent. Of course it is well known that feed filters, however efficient, can only arrest the solid matter contained in the feed water, leaving whatever may be carried into the boilers in solution to be dealt with by zinc plates and other detergents which are used in boilers for this purpose.

WATER-TUBE BOILERS IN MERCHANT SHIPS.

"The boiler question could not be dropped at this stage without considering the suitability and maintenance of water-tube boilers in merchant ships. The boilers in merchant ships must be capable of continuous working at the maximum. Reduced weight can only be of relative importance, except in very large installations, and should never be accepted at the sacrifice of reliability.

"A brief examination shows that the principal claims made on behalf of the water-tube boiler are—

(I.) Reduced weight per square foot fire grate.

(II.) Reduced weight of water per H. P. developed.

(III.) Greater adaptability for higher pressures without increasing weight.

(IV) Greater facility for raising steam without injury to the boiler.

(V.) Greater facility for repairs or renewals without disturbance of the ship's internal structure.

"It is not proposed to examine or discuss the above points from the theoretical or constructural side, as that has been dealt with ably by Admiral Melville in the proceedings of this society, and many other writers elsewhere, but rather to deal with the question of the suitability of water-tube boilers taking the place of the present shell-boiler in merchant ships, large and small.

"(I.) The difference of weight alone will not have much influence with the owner of the smaller vessels, such as the average tramp steamer with two or three boilers, as he has to

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consider the fact that his stokehold crew, and to a greater or lesser extent his engineers also, are continually changing, and that the vessel may at any time be in a port where the materials for the repair of water-tube boilers could not easily be had, and, beyond all, the necessity that he should provide ample means for a fresh-water feed make-up to meet the losses which, though common in all boilers, experience has shown are certainly not less in water-tube boilers.

"In large installations the question of weight becomes of greater importance, as in the case of a ship where the boiler-room weights are, say 1,200 tons, the reduction in weight is considerable in view of the builders' claims that the saving in favor of W. T. boilers is not less than 30 per cent. This coupled with the very much greater saving in weight of water carried in the boilers are all important factors to the naval architect and engineer, who are striving to produce a certain tonnage and horse-power on the least safe weight.

"Everything else being equal the desire of the ship owner to save weight is just as keen as the builders, but it is here that the dividing line in engineers' minds is so sharply drawn, as it is contended by many that the saving of weight by the adoption of W. T. boilers is at the sacrifice of continuous and reliable working.

"It is not upon the failures of the past that the water-tube boiler is to be condemned, but rather on the present and the prospects for the future that it is to be judged. There have undoubtedly been many bad water-tube boilers built, but there have certainly been plenty of bad shell-boilers built also, and the present-day shell-boiler, which is the outcome of long experience, bears little resemblance to the article that was produced forty years ago.

"What the water-tube boiler has suffered from largely in the past has been an unripe advocacy of their use; the boilers have been installed in ships where the conditions under which they had to work were as little understood by the builders as the new type of boilers were by the engineers, the consequence being that in many cases the boilers failed utterly and were taken out, and it was only a courageous owner who would make a second venture in water-tube boilers.

GREAT IMPROVEMENTS IN WATER-TUBE BOILERS.

"The water-tube boiler of the present day bears little relation to that of even ten years ago. In the construction of this type of boiler at present, castings have been altogether eliminated, and the highest quality of steel is now used for all purposes entering into construction and this in combination with the superior tools now used in this class of work has resulted in producing a generator the workmanship of which is excellent. The question as to which type of boiler is most suitable for merchant ships, the maintenance of which shall be normal and which shall be capable of working at its maximum for lengthened voyages, has been engaging the attention of engineers all the world over for the last five years, to a greater extent than it has for the last twenty years, and the opinion is steadily but as surely growing, that given the proper type of boiler for the specific purpose in view, and due provision made for meeting the new conditions, there exists no well-defined reason why the water-tube boiler should not be successful. The British Boiler Commission that has just completed its labors, has, after most extensive tests, unhesitatingly decided in favor of water-tube boilers.

"It has not always been the fault of the boiler that has led to condemnation, but more often on the part of the engineering complement, both afloat and ashore, to thoroughly appreciate and understand the new conditions involved, nervousness and lack of patience contributing in no small measure to failure.

"(II.) The reduced quantity of water carried in water-tube boilers is to a considerable extent offset by the necessity of the increased quantity of fresh water carried in the double bottom for make-up feed, and experience has shown that the percentage of make-up feed required in water-tube boilers is much higher than in the case of shell boilers. Some boilers have been tried with partly salt water, but I do not think engineers are yet prepared to adopt that course, but rather to get as pure a feed as ever possible.

"Water-tube boilers mean the installation of evaporators of greater capacity, unless the voyage is short, as ships cannot afford to carry large quantities of fresh water and so shut out cargo. The greatly reduced quantity of water carried in the boilers is from one point of view a drawback, as the margin of safety between 'water' and 'no water in the glass' is very materially reduced. In a shell boiler the loss of water in the glass from priming or any other cause is not immediately serious, and the boilers can usually be handled with safety until the water is restored, but in the case of the water-tube boiler the loss of water in the glass is instantly dangerous.

"It may be a simple matter to figure out what length of time may elapse from the time the water disappears out of the glass until the boiler is in jeopardy, but few engineers are prepared to take such risks, in the ordinary pressure of stokehold work, as a boiler failing to show water is an unknown quantity and should be put out of active use to prevent mishap. This danger from shortness of water in the large tube type is not so acute as it may be in the small tube or express boiler, but in any case the slightest derangement of the feed becomes serious immediately.

"Complicated feed arrangements have in the past been altogether too prevalent with water-tube boilers, and have caused a corresponding amount of trouble and damage, but arrangements of greater simplicity are now being fitted, and there is every reason to expect the feed arrangement of water-tube boilers to be just as simple as in the ordinary shell boiler.

"(III.) There is no question of doubt as to the flexibility of water-tube boilers, when it comes to the question of higher pressures, without increasing the weight to any material degree, as the steam-drum is the only member requiring to be considered. This factor is only of comparative value at present, as the most recent development hardly indicates that higher pressures are being seriously considered, the tendency being to obtain greater economy by other arrangements.

"(IV.) With shell boilers, where well thought out, and feed and boiler circulating arrangements have been adopted, there is little likelihood of damage by raising steam quickly. When the pipe arrangement is so designed that the pump can draw water from the bottom of the boiler and circulate it back through the feed heater at boiling point by the feed check into the boiler, the expansion of the boiler goes on gradually and easily, and fires can be started and steam raised in a few hours without any resulting damage. It is, however, not desirable to raise steam too quickly, nor is it often found necessary in merchant ships to do so, as they usually have scheduled times for sailing or they are so situated that due notice can be given.

"In ferry-boats where the vessel is kept closely at work or in ships other than merchant ships, this factor is no doubt of great value, but in merchant ships it can only be of minor importance.

"(V.) The necessity of making provision to allow for renewal of a ship's boilers is never considered during construction, although it has to be faced in many ships during their lifetime, and is always a costly and tedious business, involving much loss of time and damage to the ship's internal structure.

"Where the opportunity has admitted of boilers being well taken care of and a long life of work of upwards of twenty years had been gotten out of them, many owners do not con-

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sider it a good investment to reboiler a more or less obsolete ship, as the extra expense due to reboilering is very considerable in old ships for the renewal of decks, tank tops, bunkers, etc., etc.

"Where boilers require to be renewed, the fact that the water-tube boiler can be split up into its separate members and passed either through the funnel opening or through a bulkhead is of undoubted advantage to the owner, but I am convinced that the two points (I) and (II) are the all important questions that will be considered by engineers and others as to what type of boiler is suitable for merchant ships.

"There is not, in my opinion, any sound mechanical reason why water-tube boilers should not work well—enterprise and patience will demonstrate this assertion—experience and confidence on the part of the personnel will be gained, better bafiling will result in an improved efficiency and economy, just as spiral retarders have improved the economy of the shell boiler, and as the boilers come into more general use they will be better understood, and will, without a doubt, be improved, and become as reliable as any other type of boiler.

"The successful working of water-tube boilers lies in the more highly capable and intelligent management of the stokehold."

The remainder of Mr. Haig's paper dealing with forced draft, superheating and pumps will be used in the next issue of the Review.

CARRYING COAL TO MANILA

As predicted in our issue of last week the bureau of equipment of the navy department has invited bids for the carriage of 30,000 tons of coal to Manila—this in addition to the 20,000 tons of coal already allotted to the American vessels that bid under the last adevrtisements. The new bids are solicited from foreign and American tonnage, and will be opened in about ten days. It is hoped that American tonnage, sail and steam, will again offer in sufficient quantity, and that the reasonable rates made by American vessel owners at the last bidding will not be appreciably increased. Because the bureau of equipment waited too long to ask for bids, a shortage of coal at Manila threatens, and there is danger that foreign tonnage may be employed in the "emergency" in which the bureau now finds itself. It is "up to" American vessel owners to make such tenders of tonnage as will wholly remove the fear of the employment of foreign tonnage for the carriage of any part of the total 100,000 tons of coal to be shipped to Manila during the current year. When congress deferred until July 1, 1906, the application of our coastwise laws to our trade with the Philippines that the statutes then provided should apply on July 1, 1904, American vessel owners were cut out of return cargoes homeward, because the control of their shipment from Manila is in foreign hands which are resolutely opposed to American vessels securing a pound of it. This will cause them to sail in ballast to some other part of the world for a cargo home. This act of bad faith on the part of congress has, most naturally, made American vessel owners extremely timid about building tonnage adapted especially for the trade with the Philippines, ready for use on July 1, 1906, because of the very natural fear that congress may again defer the application of our coastwise laws to our trade with the Philippines. The foreign shipping interests, in whose interest the date was set at July 1, 1906, positively assert that it will still again be deferred, the next time until July 1, 1909, and the success of these foreign shipping interests in the past justify the very natural apprehensions that are now felt by American vessel owners. These facts should be known to explain the apparent apathy of American ship owners and the apparent dearth of American tonnage for the carriage of the coal to Manila needed there for our navy.

OUR OVERSEA CARRYING TRADE

The Ceaseless Efforts of the Foreign Lines to Prevent Ship Owners Getting Their Share of It—Activity of Hamburg-American Line's Manager

The great foreign steamship lines which enjoy what amounts to a practical monopoly of our transatlantic trade, it may be said without fear of contradiction, maintain agencies in the United States whose business it is to in every way possible discourage and prevent any new competition. That this has been the practice of the agents of these lines no one familiar with the failures that have followed every effort to build up American shipping has had the least doubt. The trouble has been that the efforts that these lines, through the assistance at their command in this country, have put forth have been of a very guarded and concealed character. In this they have shown a degree of acumen that justified their retention in the posts of such vital importance to the parent foreign company that they occupy. But, it would seem, from a careful perusal of the New York Herald's annual financial and commercial review, published on Jan. 2, 1905, that at least one of the agents in question, the distinguished representative of the great German Hamburg-American Line, has felt that the grip upon our foreign, especially our transatlantic, carrying which foreign steamships enjoy, now renders no longer necessary any concealment of the opposition that foreign shipping interests in secret have so long and so successfully exerted against American shipping.

Mr. Emil L. Boas, the New York agent of the German Hamburg-American Line—possibly the more important of the two great German steamship lines that enjoy such prestige and favor with the imperial government—talks in the most frank manner possible of the utter futility of any attempt that may be made by the American government to build up its ocean-going shipping. Mr. Boas would scarcely admit that he is solicitous for the building up of American shipping, nor would he any more willingly admit that he was unsolicitous of the interests of the Hamburg-American Line that he so ably represents. That is his business and doubtless he is well paid for it. The American people should not, at least, forget that most important fact. Having it constantly in mind, as they should do in reading his objections to every form of government aid suggested for the upbuilding of American shipping, they will easily enough understand the force of the underlying reasons prompting his criticisms. This is more true inasmuch as Mr. Boas is extremely careful not to venture a single suggestion that would benefit American shipping; in fact, he makes it perfectly clear that present conditions, under which foreign ships control 97 per cent of our entire trade with Europe, are best for all concerned.

This complacent view of the matter expressed by Mr. Boas he is forced to unwillingly admit is not shared by the American people, whose insistent demand for a remedy for existing conditions, headed by President Roosevelt, led the latter to recommend to congress at its last session, and led congress to provide for the appointment of a joint congressional commission to study the subject in detail. This the commission in question has done having held public hearings in all parts of the country, having elicited the views of everybody who would appear before them, and which commission is on the eve of filing its final report and a bill to carry into effect its recommendations. Fearing its effect, Mr. Boas desires to forestall and influence public opinion by discrediting any possible plan that may be recommended. His boldness is only equalled by his frankness, as he evidently thinks the foreign monopoly of our foreign carrying is invincible. A doubt that lingers in his mind, doubtless led him to say:

"The United States has had the benefit of the world's competition in ocean transportation, and under it has built up a magnificent foreign commerce. Is it going to cripple and disorganize this enormous trade by the enactment of discrimi-

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strong duties and resultant higher freight rates and insufficient shipping opportunities?"

The only disorganization of our foreign trade, Mr. Boas is keen enough to realize, would fall upon the foreign shipping that now monopolizes its carrying, in which his own line is such an important factor, and precisely at that point the shoe promises to pinch. When he asserts, however, that there would be higher freight rates, under American encouragement of its shipping, he states what he should know, but for the moment has conveniently forgotten, that the moment an American ship should ask a higher rate for carrying ocean freight than a competing foreign ship would carry it for, that moment the foreign ship would get the carrying. Mr. Boas knows that in order for any American ships to secure any portion of our foreign carrying now done by foreign ships the American ships would be compelled to offer, and would offer, to carry it at a lower rate than is now charged by foreign ships. This, too, is a probability that neither Mr. Boas, nor the great German Hamburg-American Line he represents, can look forward to without any but the keenest apprehensions, and in opposition to which, we may be very sure, they will interpose every obstacle possible.

While he sneers at attempts to secure aid for American shipping from our government, he is careful not to point out that, because of the very peculiar but none the less effective aid extended to German steamship lines by the German government, British manufacturers have been known to send their manufactures from the interior of Great Britain to the interior of Germany for re-exportation from Germany to its destination abroad.

Last of all, Mr. Boas makes what appears to be a direct appeal to the Democratic party, which he indicates he believes is opposed to any form of encouragement of American shipping, to do its utmost to oppose its rehabilitation in the foreign trade. However able and adroit Mr. Boas may be, at this he has rather overshot his mark, in making this appeal. The Democrats have, to be sure, shown of recent years some reluctance to grant direct subsidies to American ships, but the statement from the agent of a great foreign steamship line that he looks to that party to render the competition of American shipping uninjurious to his line, by the withholding of the aid of our government from our shipping seems to us to have been conceived in folly and uttered in dangerous indiscretion.

Mr. Boas thinks it wise to deprecate the value of merchant ships and trained seamen as an auxiliary aid to our navy, an aid that has seemed of such vast importance to the other maritime nations as to induce them, in the aggregate, to spend some $20,000,000 annually in subsidies, subventions, construction and navigation bounties and other aids for their upbuilding and maintenance. Mr. Boas doubtless counts upon the short memories and forgetfulness of things maritime on the part of the American people when he, the chief agent of a great foreign steamship line, assumes to lecture the American people as to their duty toward American shipping, because he certainly would not like to have recalled to their recollection the fact that, during the Spanish-American war, scores of idle German steamships seem to Spain, and so willing were the great German steamship lines to allow Spain to use them, that ships built for and partially worn out in the trade between the United States and Germany were actually sold from under the German flag to the Spanish government and fitted out to prey upon and destroy American shipping! Had American, instead of German, steamships been engaged in our trade with Germany, would Mr. Boas dare to say that they would have been sold to the Spanish government for the purpose of destroying American commerce? Mr. Boas, by his recent published utterances against American shipping, fortunately accomplishes our purpose. He reminded us of the inexpressible loyalty of German steamship lines engaged in trade with the United States during our war with Spain, the only steamship lines, if we remember aright, that gave any aid and encouragement in that time of war to our national enemies!

ITEMS OF GENERAL INTEREST

Bids were opened last week in the bureau of yards and docks, navy department, Washington, for the construction of dry dock No. 4 at the New York navy yard. The bids were as follows: John Peirce of New York, $885,000; New York Continental Jewell Filtration Co. of New York, $829,880; United Engineering & Construction Co. of New York, $815,934; Buckley Realty Construction Co. of New York, $806,400; George B. Spearen of New York, $773,292. The appropriation for the above work complete is $1,000,000, and the dry dock will be constructed of granite and concrete.

The rigid specifications drawn by the United States navy department for auxiliary engines required in the equipment of vessels of recent construction, have done much to improve their general standard of efficiency. It is therefore unusual to find that even these exceptional requirements have been improved upon. Such, however, is noticeably true in the case of recent designs of vertical cross-compound engines built by the B. F. Sturtevant Co., Hyde Park, Mass., for direct-connected generator driving. They have actually shown upon an economy test a consumption of steam per horse power per hour fully 4 lbs. less than that demanded by the specifications. These results are characteristic of a line of specially high grade engines being built by the above mentioned company to develop from 25 to 150 H. P.

There is building at the Napier works in England a new motor boat on radical lines for Mr. Leopold Rothschild. It is expected that she will be very speedy. The skin is to be four-ply cedar and mahogany, with a fine silk lining between, dressed with an elastic preparation. The several thicknesses are sewn together with phosphor bronze thread. The motor is to have six cylinders mounted in singles, with large exhaust valves on the port side and equally ample inlet valves on the starboard. The engine, together with all accessory gear, will be installed very low in the boat to lower the center of gravity of the weights. In front of the large engine there will be a small, single cylinder starting motor, which drives by means of friction and ratchet clutches on the geared flywheel. All the reversing gears, thrust bearings, etc., will be contained in an oil and watertight casing, and run in submerged oil. Yarrow will make the propellers and extensive experiments will be carried out.

An interesting advertisement is now to be found in European shipping papers. The Discovery Antarctic exploration steamer is for sale. She is thus described: "Wooden barque-rigged auxiliary screw steamer, now lying in the East India dock, London. Specially built by Dundee Ship Builders' Co., at Dundee, in 1900, for the British antarctic expedition; framing of British oak, and planking of American elm and pitch pine, sheathed with iron bark and greenheart. Length, 170 ft. 3 in.; breadth, 33 ft. 8 in.; with a mean draught of 16 ft., and displacement of 1,570 tons. Triple expansion engines by Gourlay Bros. & Co., Dundee; 550 I. H. P.; cylinders, 14½ in., 22½ in. and 36 in. by 30 in. stroke; steams 7 knots on about 7 tons; lifting propeller and rudder. Complete electrical installation fitted with special regard to scientific purposes. Is amply found in stores of every description and is in first-class order. For further particulars, with orders to inspect, apply to David Bruce & Co., 10 and 11 Lime street, London, E. C." This advertisement is certainly unique as the market for craft of her kind is very limited. As the desire for adventure in cold countries seems to be insatiable, it might prove to be a very good speculation to buy the Discovery as an investment. She ought to last half a century with moderate care, and a purchaser might turn up at any moment.

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CALENDARS

These are the days when calendars are to be expected. Each year seems to mark an improvement on the last, the three color process offering unlimited scope for design. The calendar of C. F. Harms, 140 Broad street, New York city, is not, however, of the pictorial variety but is eminently practical. It not only gives the days of the month but indicates morning and evening high water at various points and follows the phases of the moon.

The calendar of the Baldt Anchor Co., Chester, Pa., is a reproduction of Wesley Webber's painting "Moonlight on Long Island Sound,' and represents a fleet of schooners putting out to sea. The subject naturally affords a wide field for excellent color effects.

The Ashton Valve Co., 271 Franklin street, Boston, Mass., has taken one of the so-called photographic art studies for the center of its calendar. The photograph represents a young woman at an old rail fence and the title is "Meet Me At the Bars." 'Most anyone would.

The A. W. Harris Oil Co. of Providence, R. I., has produced a very interesting little calendar containing a three-color picture of Thomas Blink's painting "The Thoroughbreds," representing two hunters jumping a creek. Incidentally the company's valve oil for internal and engine oil for external lubrication of all types of steam engines is advertised.

No painter seems to get into his work more rounded and full-blown beauty than Asti whose heads of women have been made famous the world over by calendar houses. What the heads of Rondel, however, lack in splendor as compared with Asti's is compensated for by a certain air of purity and refinement. The Cleveland Pneumatic Tool Co., Second and Hawthorne avenues, Cleveland, have adopted for their 1905 calendars an example of the heads of both of these artists. Both are wonderfully decorative and are sure to arrest attention everywhere.

The calendar issued by J. U. Karr, dealer in groceries, meats and general ship supplies at No. 169-171 River street, Cleveland, is sufficient to tittilate the jaded epicureanism of the most aristocratic palate. The calendar is a reproduction of Wolring's conception of Tennyson's Adeline, "Wherefore those dim looks of thine, shadowy, dreaming Adeline." As a bit of reproductive work it is certainly on a par with anything that has ever come into this office. The whole effect of the painting has been retained with the utmost fidelity, even to the brush marks on the background. The colors are so arranged that one emphasizes the other, the wealth of black hair upon the head and the deep red of the background accentuating the loveliness of the flesh tones. Mr. Karr will probably have more calls for this calendar than he will be able to fill. Incidentally his business as a ship chandler is advertised, and most effectively so, for one would be disposed to keep such a calender as this all the year round.

CANALIZING THE OHIO RIVER

Hon. T. E. Burton, chairman of the committee on rivers and harbors of the house of representatives, has recently informed representatives of Ohio valley interests that he will favor a provision in the forthcoming river and harbor bill for a survey for the canalization of the Ohio river on a 9-ft. stage from Pittsburg to Cairo. Albert Bettinger of Cincinnati, vice president of the Ohio Valley Improvement association, recently carried this information home with him after a conference with Mr. Burton. Col. J. L. Vance, president of the association, heard the same thing from Mr. Burton in a conference on Saturday last. Agitation for a 9-ft. stage in the Ohio has been on for several years. Mr. Burton, whose influence is paramount in shaping river and harbor legislation, was not ready to consent to 9-ft. stage legislation until the time should be ripe. Moreover, he desired more satisfactory information than he possessed when this agitation began as to the canalization of rivers. The question will undoubtedly come to be one of the biggest with which the government will have to deal in internal improvement work. To illustrate it may be said that estimates as to the cost of putting the Ohio on a 9-ft. stage vary from $40,000,000 to $100,000,000, the difference in opinion arising from varying judgment as to the number of locks and dams to be required. The survey to be authorized in the coming river and harbor bill will be an accurate estimate of the cost.

TRADE NOTES

The Falls Hollow Staybolt Co., Cuyahoga Falls, O., is in receipt of an order from the Baldwin Locomotive Works for several thousand feet of double, refined charcoal iron hollow bars, to be used in the staying of fire boxes on a number of locomotives which the Baldwin company is to build for a railway in Brazil. The Falls Hollow company reports that their trade with the railways of the United States, Canada and Mexico for 1904 was double that of 1903 and that they are receiving orders from all quarters of the globe. During the past year the company made a number of improvements to its plant, installing new water wheels, erecting additional heating furnaces, together with another building which has practically doubled the capacity of the plant.

The Northern Engineering Works, Detroit, Mich., report recent shipments of cranes as follows: Bethlehem Foundry & Machine Co., 4-ton electric crane, 43-ft. span; Public Service Corporation of New Jersey, 10-ton, 39-ft. span; New York Butchers' Dressed Meat Co., 12-ton, 39-ft. span; Union Metallic Cartridge Co., 12-ton, 30-in. span; People's Power Co., Rock Island, 10-ton, 50-ft. span; Duluth Street Railway Co., 20-ton electric crane, special.

The three-masted schooner Mary Bradford Peirce is nearly completed at the yard of Washburn Bros., Thomaston, Me. The Peirce is a three-masted single deck vessel, 142 ft. long, 34½ ft. beam and 11 ft. deep. Her frame is hard wood and hackmatack square fastened. The planking is 4-in. yellow pine and the ceiling 8 in. of the same material. Her equipment is quite complete, including a Hyde double drum engine, boiler, windlass and double winch head, two hand pumps and two steam pumps, Robinson patent steering gear and Camden stock anchors. The heads of the departments taking part in the construction are: Elliot K. Washburn, master builder; B. F. Dunbar, joiner; P. N. Parks, fastener; Sewall Hatch, blacksmith; C. E. Hastings, painter; R. E. Dunn, rigger; C. L. Robinson, caulker; A. B. Sampson, sparmaker; Washburn Bros., sailmakers. She is the twenty-sixth vessel built by Washburn Bros.

In an opinion declared last week by Frank L. Campbell, assistant attorney general for the interior department, it was held that the laws of the United States are not applicable to the Panama canal zone. The question at issue was whether or not the patent or trade mark law extended to the canal zone. The canal zone is described in the opinion as not being an organized territory of the United States.

Stearns & McKay, Marblehead, Mass., are building a 35-ft. hunting launch for M. Nelson Faulk of Philadelphia. The launch will be fitted with a 12-H. P. Standard engine.

The firm of H. M. & R. L. Bean, Camden, Me., has taken an order to build a five-masted schooner for the Coastwise Transportation Co. of Boston, Mass.

Vice Admiral Lord Charles Beresford has been appointed to succeed Admiral Domville in command of the Mediterranean squadron.

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Austrian Imperial Navy	56,700	"
Italian Royal Navy	13,500	"
Chilian Navy	26,500	"
Argentine Navy	13,000	"
The "Messageries Maritimes" Company	87,600	"
Chemins de fer de l'Ouest: (The French Western Railway Co.) Steamships plying between Dieppe and Newhaven	18,500	"
Total Horse Power of Boilers in Use	1,884,860	

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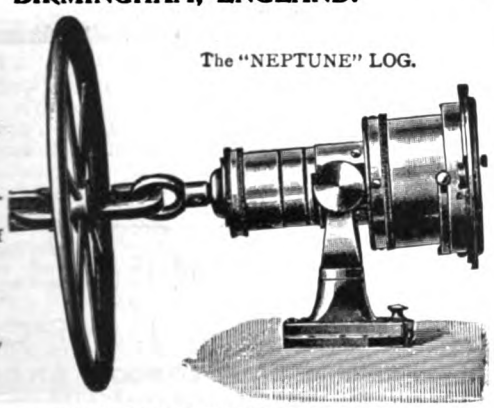

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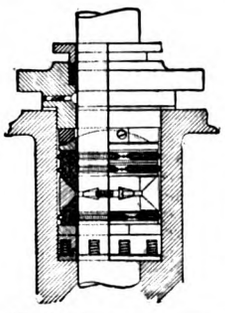

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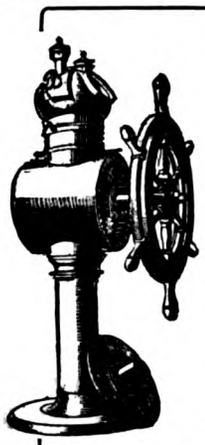

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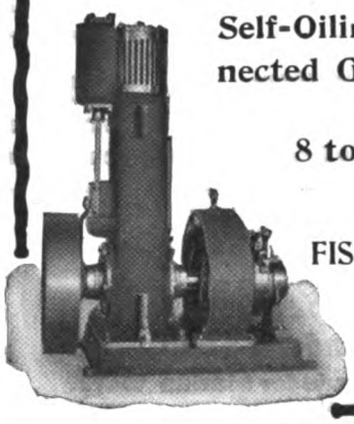

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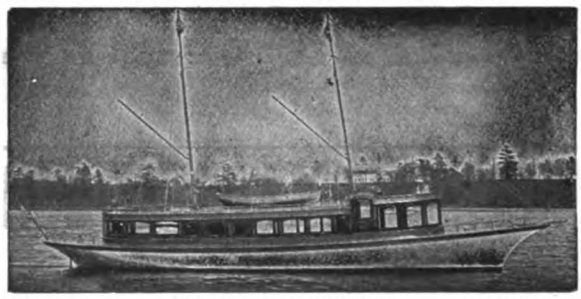

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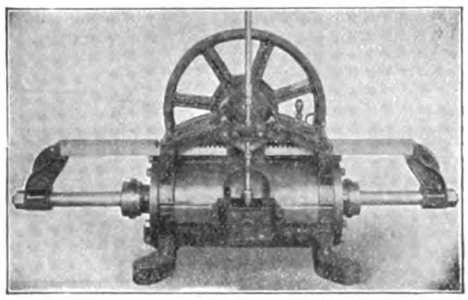

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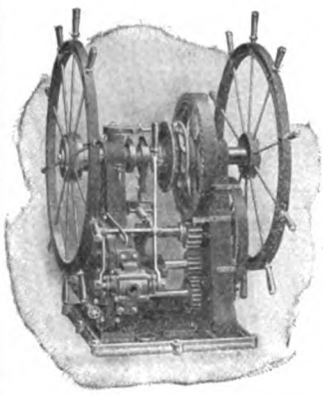

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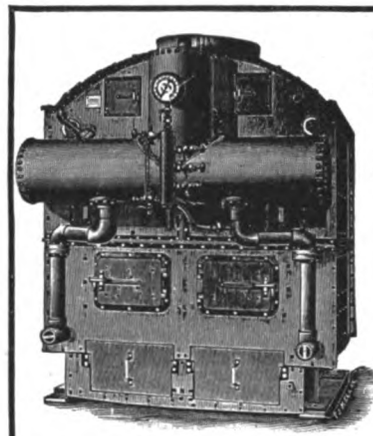

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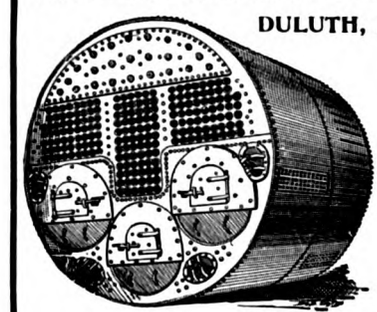

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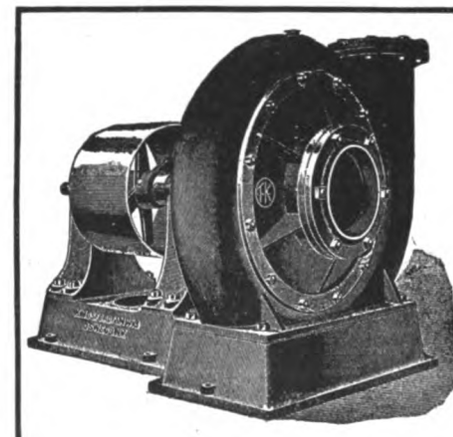

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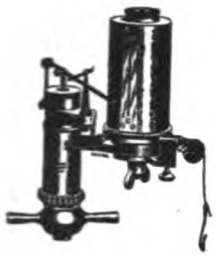

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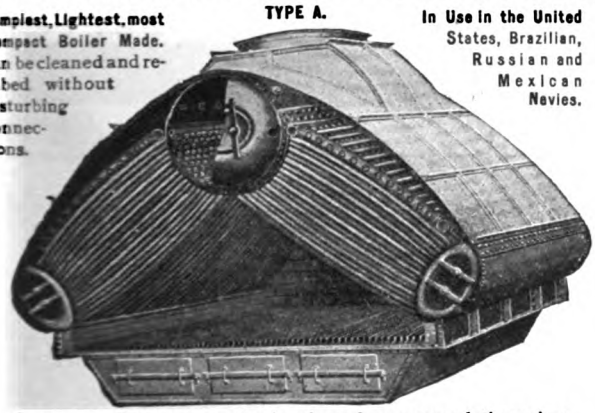

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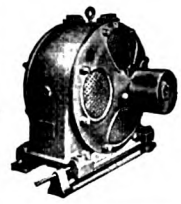

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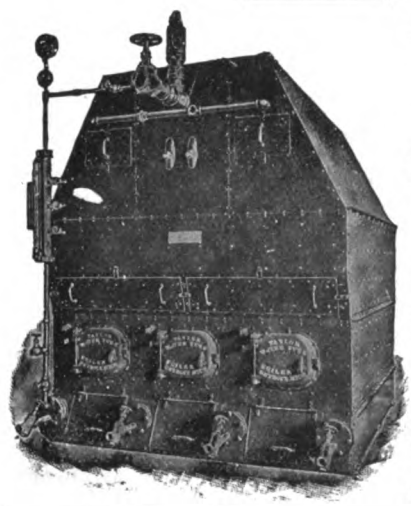

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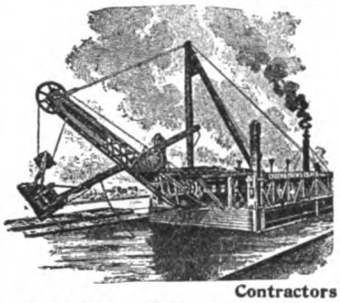

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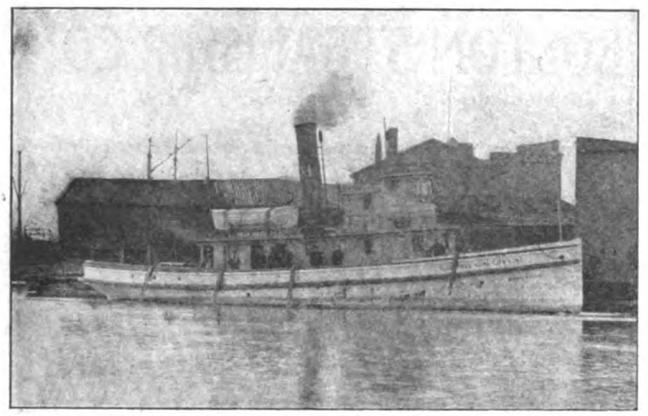

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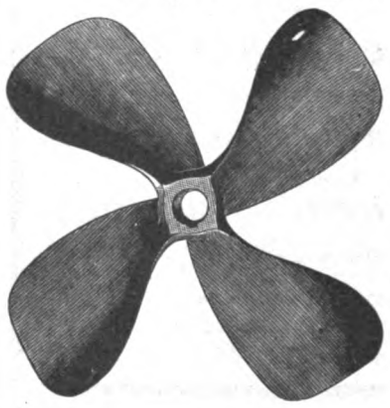

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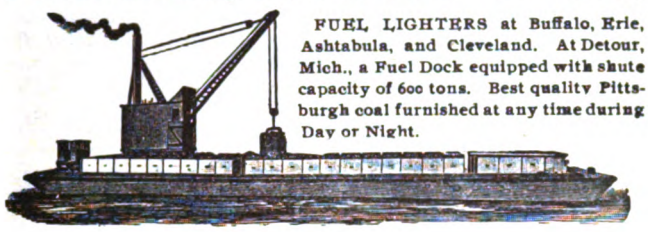

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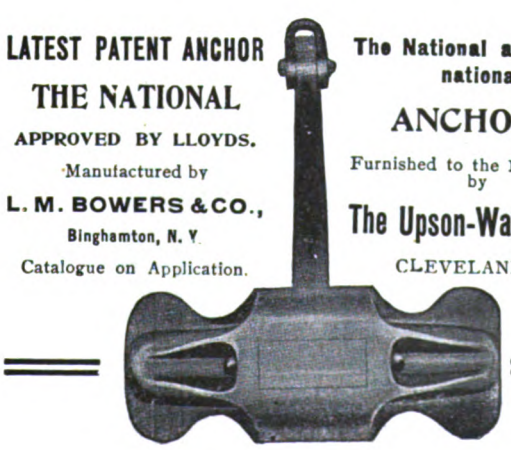

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Lake Superior Contracting & Dredging Co., ...Duluth, Minn.
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Smith Co., L. P. & J. A.....Cleveland.
Starke Dredge & Dock Co., C. H...Milwaukee.
Sullivan, M. .....Detroit.

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Macbeth Iron Co.....Cleveland.
Reading Iron Co.....Reading, Pa.

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Atlantic Works, Inc.....Philadelphia.

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Reading Iron Co.....Reading Pa.

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Fore River Shipbuilding Co.....Quincp, Mass.
Great Lakes Engineering Works.. Detroit.
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Jenks Ship Building Co....Port Huron, Mich.
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Marine Iron Works ..... Chicago.
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Superior Ship Building Co....Superior, Wis.
Thropp & Sons Co., J. E.....Trenton, N. J.
Trout, H. G.....Buffalo.

PROJECTORS, ELECTRIC.
General Electric Co.....Schenectady, N. Y.
Westinghouse Electric & Mfg. Co..... ..... Pittsburg, Pa.

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Great Lakes Engineering Works Detroit.
Marine Iron Works ....Chicago.
Kingsford Foundry & Machine Works.... ..... Oswego, N. Y.

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Lunkenheimer Co. .....Cincinnati.

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Upson-Walton Co.....Cleveland.

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Chicago Nautical School.....Chicago.

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Westinghouse Electric & Mfg. Co..... .....Pittsburg, Pa.

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Otis Steel Co.....Cleveland.
Reading Iron Co.....Reading, Pa.

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Bertram Engine Works Co., Ltd.Toronto, Can.
Buffalo Dry Dock Co.....Buffalo.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Chicago Ship Building Co.....Chicago.
Detroit Ship Building Co.....Detroit.
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Great Lakes Engineering Works.....Detroit.
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Milwaukee Dry Dock Co.....Milwaukee.
Newport News Ship Building Co..... .....Newport News, Va.
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Shipowner's Dry Dock Co.....Chicago.
Smith & Son, Abram.....Algonac, Mich.
Willard, Chas. P. & Co.....Chicago.

SHIP CHANDLERS.
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Marine Mfg. & Supply Co.....New York.
Upson-Walton Co.....Cleveland.

SHIP DESIGNERS.
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Kreer & Parsons.....Chicago.
Matteson & Drake.....Buffalo.
Rice & Lovejoy.....Buffalo.
Steel, Nacey & Hynd.....Cleveland.
Wood, W. J.....Chicago.

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Martin-Barriss Co.....Cleveland.

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Smooth-On Mfg. Co.....Jersey City, N. J.

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Falls Hollow Staybolt Co..Cuyahoga Falls, O.
Reading Iron Co.....Reading, Pa.

STEAM VESSELS FOR SALE.
Gilchrist & Co., C. P. .....Cleveland.
Holmes, Samuel .....New York.
Lester, S. S.....Quebec, Can.
McCarthy, T. R.....Montreal, Can.

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Anchor Line .....Buffalo.
Boston Steamship Co .....Boston.
International Mercantile Marine Co..... ..... Philadelphia.
New York & Cuba Mail S. S. Co.....New York
Red Star Line .....New York.
United Fruit Co .....Boston.

STEEL CASTINGS.
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Otis Steel Co.....Cleveland.

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Chase Machine Co.....Cleveland.
Dake Engine Co.....Grand Haven, Mich.
Detroit Ship Building Co.....Detroit.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co....Port Huron, Mich.
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Moulton Steering Engine Co.....New York.
Pawling & Harnischfeger .....Milwaukee.
Sheriffs Mfg. Co.....Milwaukee.

SUBMARINE DIVING APPARATUS.
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Lovejoy, H. O.....Buffalo.
Matteson & Drake .....Philadelphia.
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Rice, Henry .....Buffalo.
Steel, Adam .....Cleveland.
Wood, W. J.....Chicago.

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Lunkenheimer Co .....Cincinnati, O

TILING, INTERLOCKING RUBBER.
New York Belting & Packing Co...New York.

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Watson-Stillman Co.....New York.

TOOLS, WOOD WORKING.
Atlantic Works, Inc.....Philadelphia.

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Kieley & Mueller .....New York.
Sturtevant Co., B. F., ...Hyde Park, Mass.

TRUCKS.
Boston & Lockport Block Co.....Boston.

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Shelby Steel Tube Co.....Pittsburg, Pa.

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Ross Valve Co. ..... Troy, N. Y.

VALVES FOR WATER AND GAS.
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Ross Valve Co. ..... Troy, N. Y.

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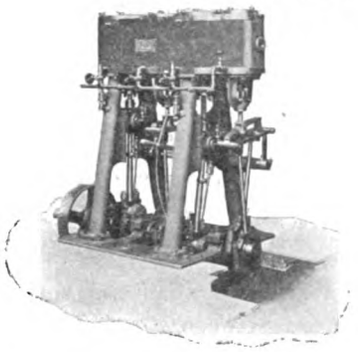

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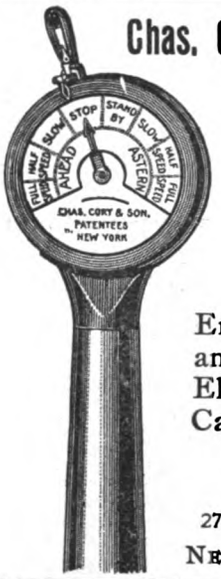

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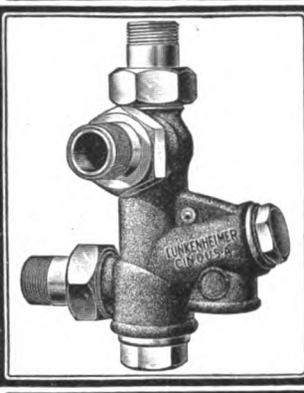

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No. 22, Lake Shore Limited	*2:12 a.m.	*2:20 a.m.
No. 20, Chicago and Cleveland Exp.	*7:20 a.m.	.....
No. 28, New York and Boston Exp.	*7:40 a.m.	*8:00 a.m.
No 40, Toledo and Buffalo Accom	†10:00 a.m.	†10:30 a.m.
No. 32, Fast Mail	*11:25 a.m.	*11:30 a.m.
No 48, Accommodation via Sandusky	†1:40 p.m.	.....
No. 42, Boston–New York Express	.....	*11:45 a.m.
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No. 46 Southwestern Express	.....	*3:10 p.m.
No. 116, Ashtabula Accommodation	.....	†4:30 p.m.
No. 6, Limited Fast Mail	*5:40 p.m.	*5:45 p.m.
No. 26, 20th Century Limited	*7:40 p.m.	*7:43 p.m.
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No. 126, Norwalk Accommodation	†7:55 a.m.	.....

Westward	Arrive from East	Depart West
No. 7, Exposition Limited	*12:50 a.m.	.....
No. 11, Southwestern Limited	*2:55 a.m.	.....
No 9, Day Express	.....	†6:10 a m.
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No. 19, Lake Shore Limited	*7:15 a.m.	*7:25 a.m.
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No 33, Southwestern Express	*12:25 p.m.	.....
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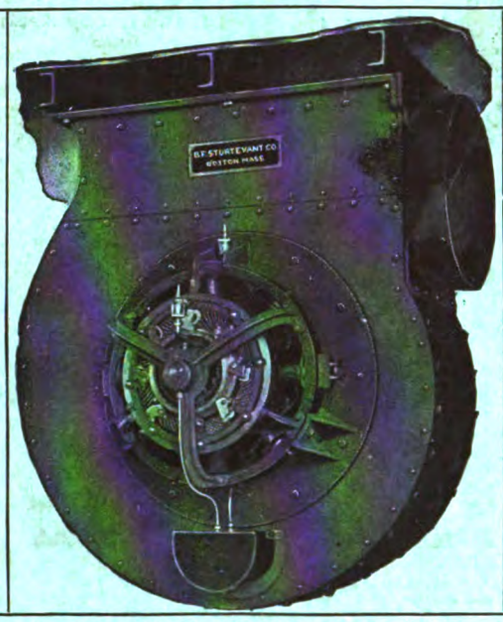

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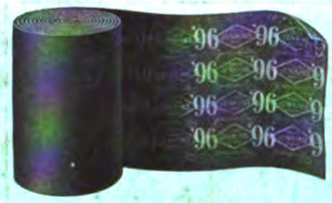

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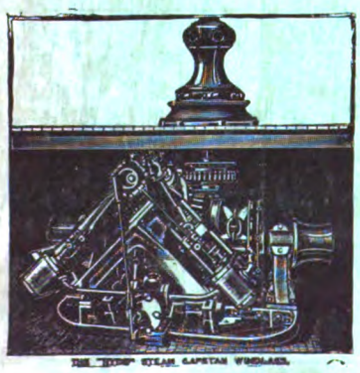

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